

Machine and Tool **BLUE BOOK**

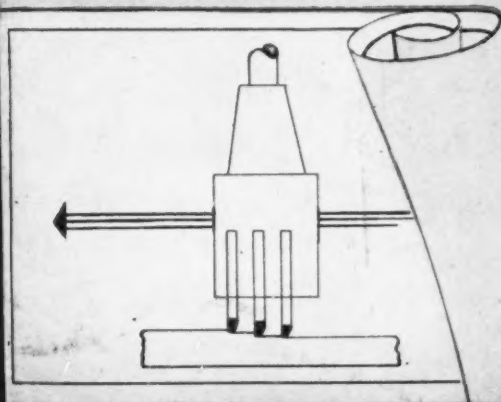
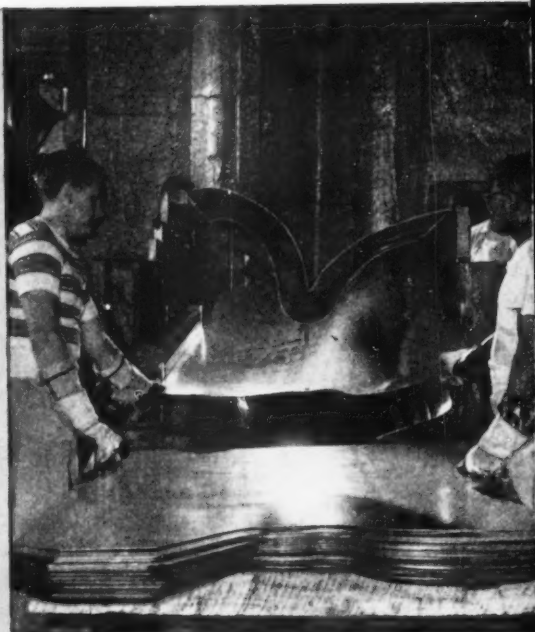
OCTOBER 1954

**Drawing and
Wrapping Fenders
at Studebaker** ▶

Time Study

**Special Report
on Presses**

**Cutting Forces
in Machining**



Letters to the Editor

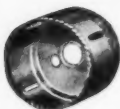
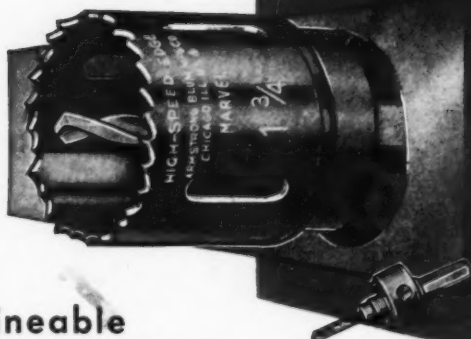
**Report on
Depreciation
and Taxes**

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Cut...

LARGE HOLES

... thru any machineable material up to 1 1/8 INCHES thick!



Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."

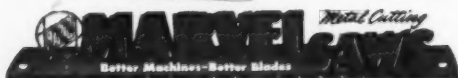
MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

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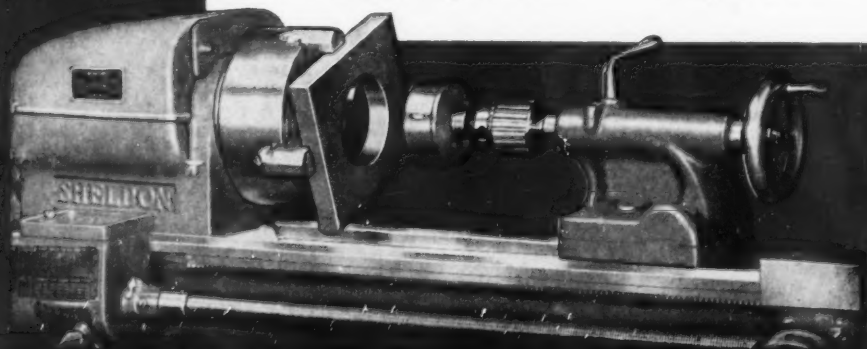


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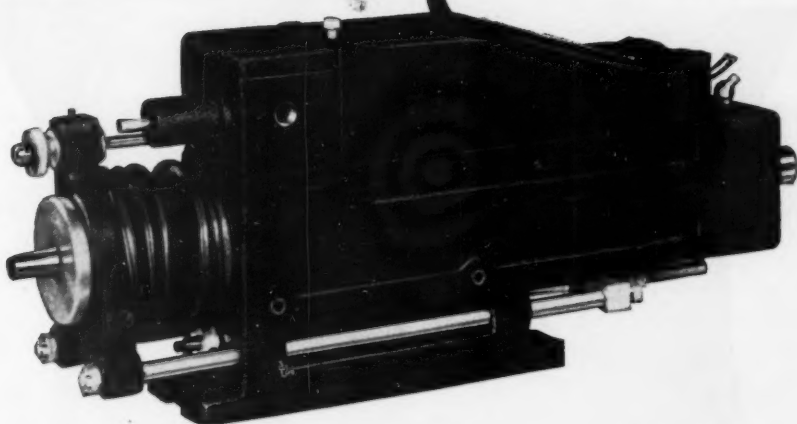
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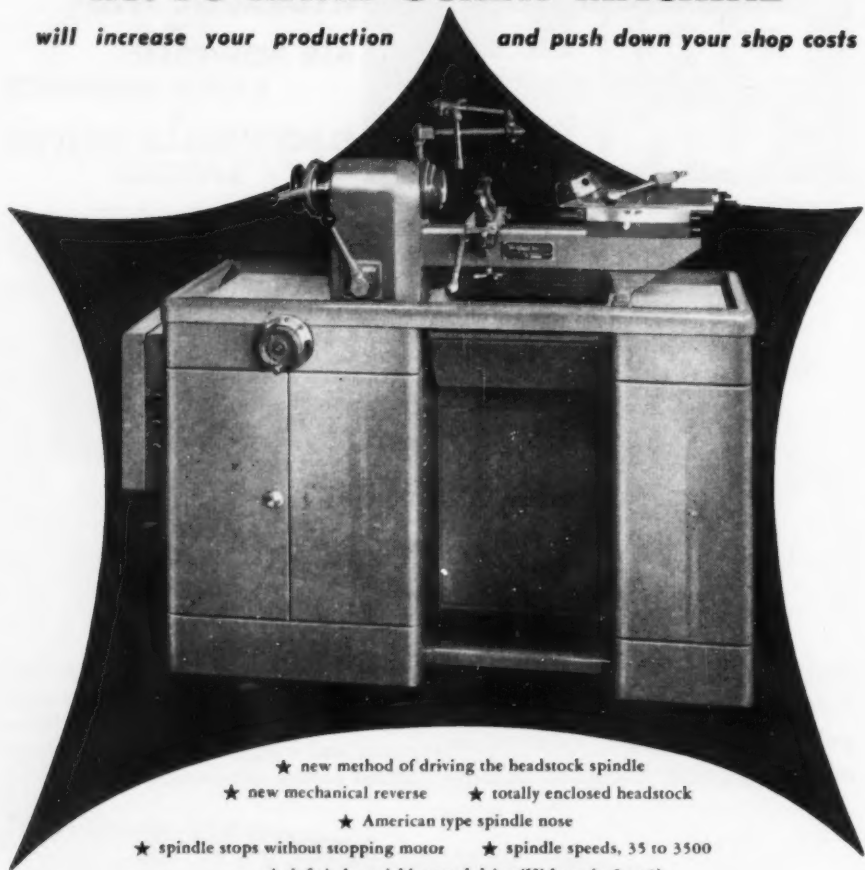
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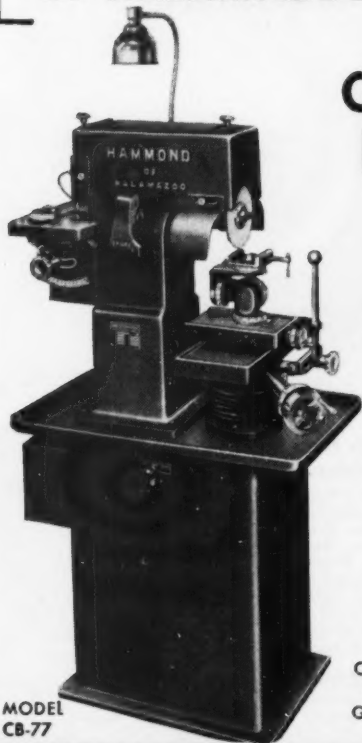
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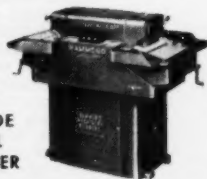


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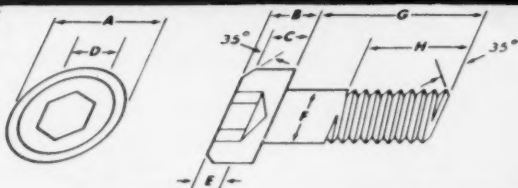
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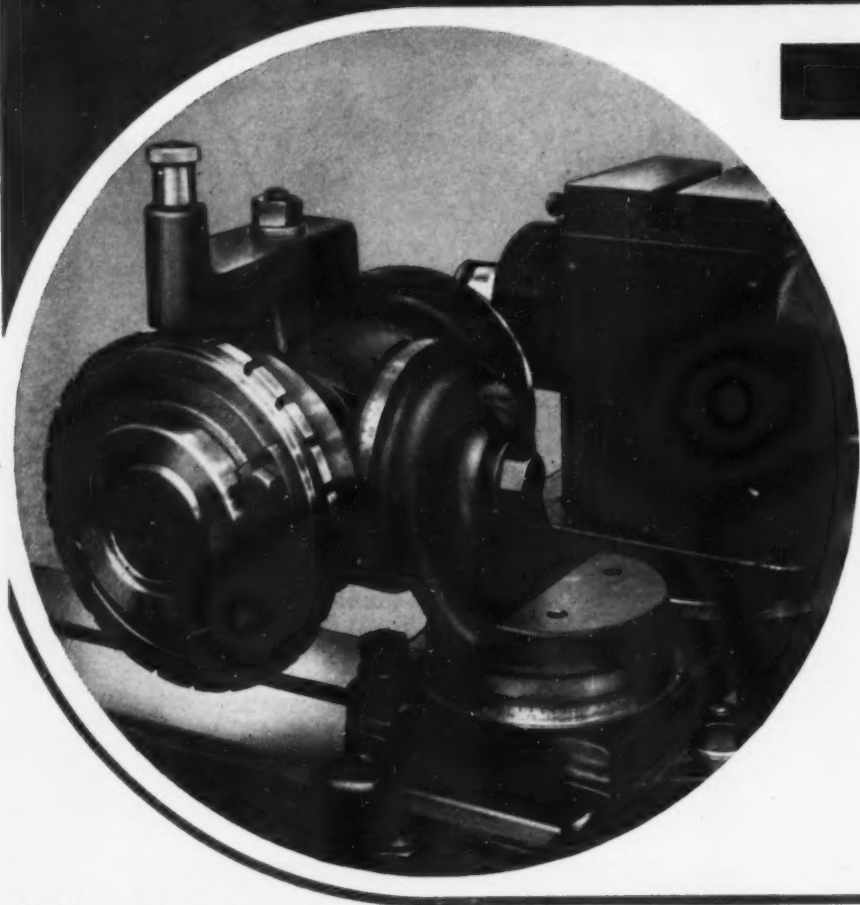
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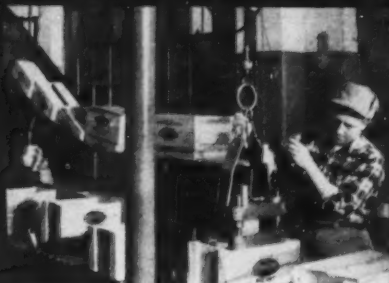
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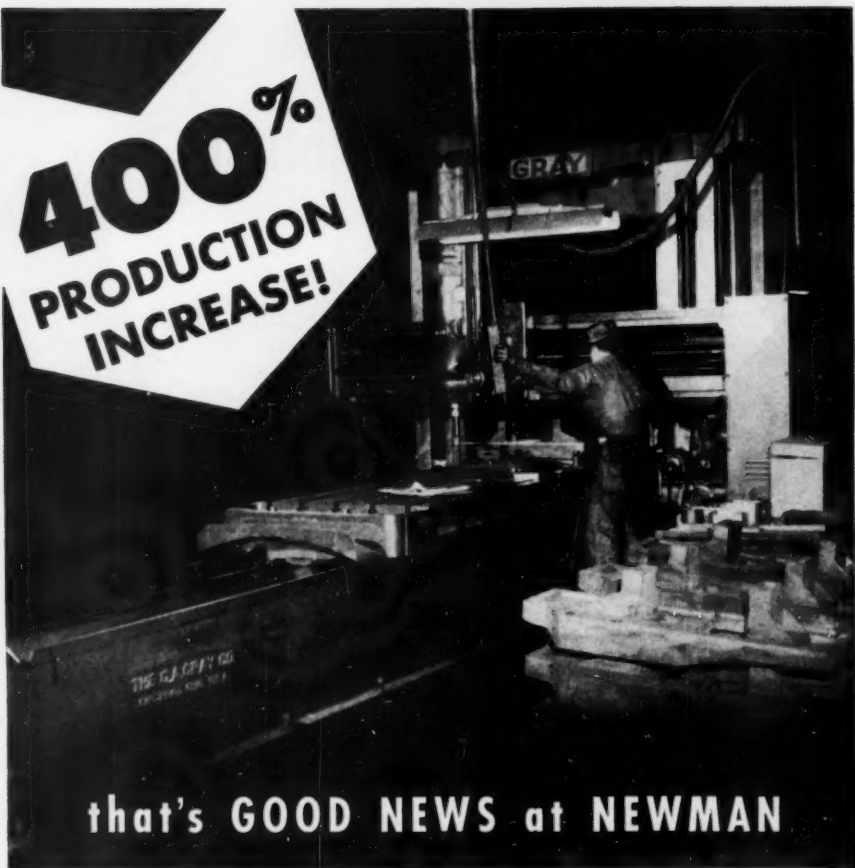
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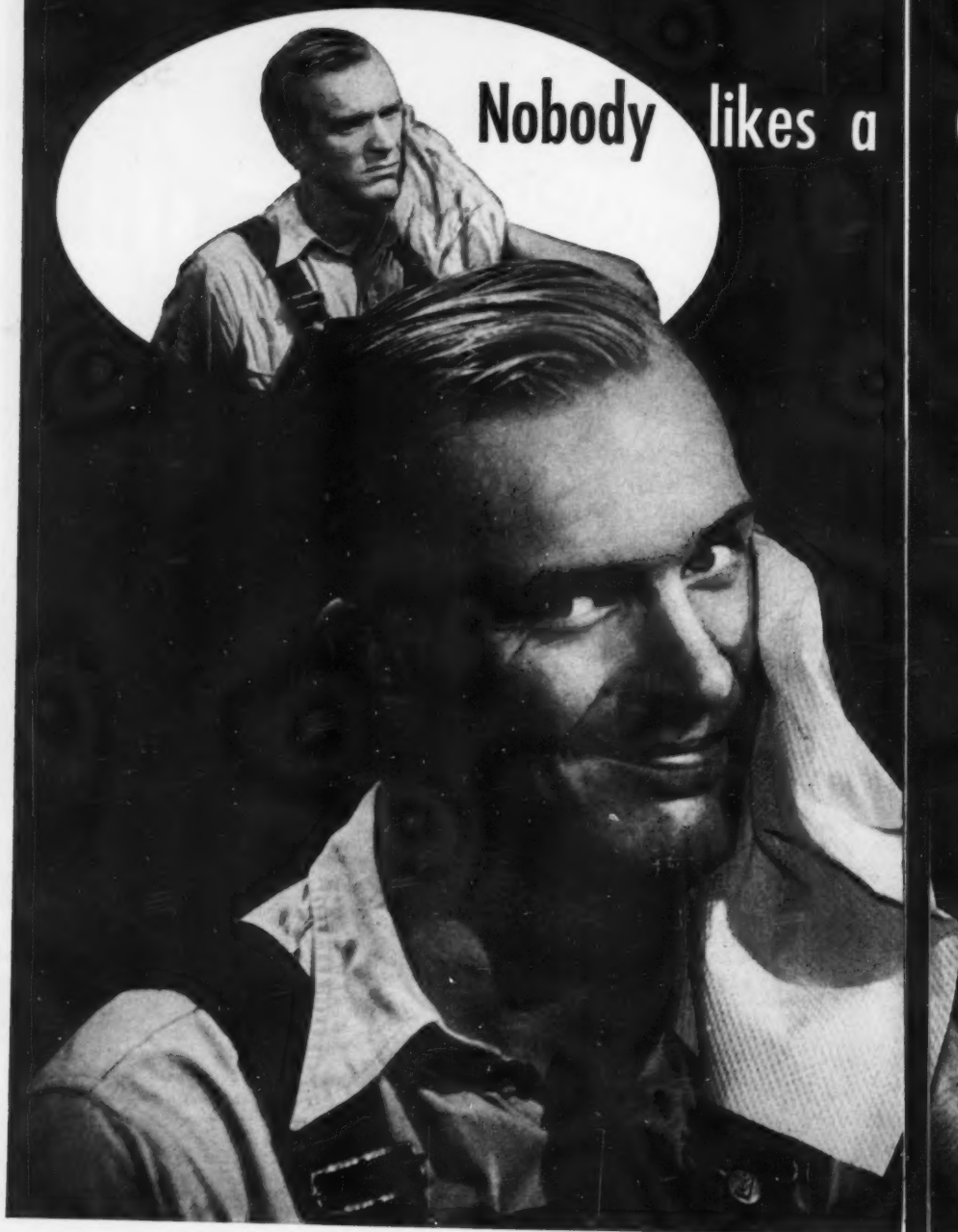
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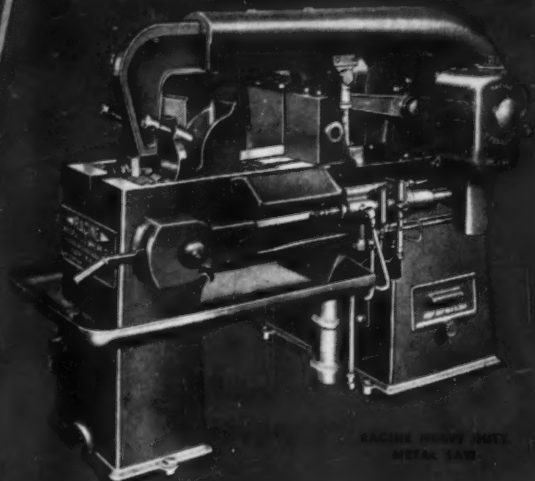
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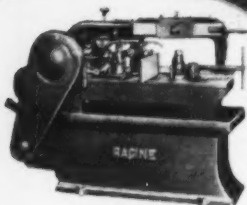
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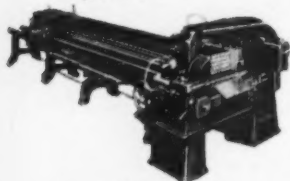
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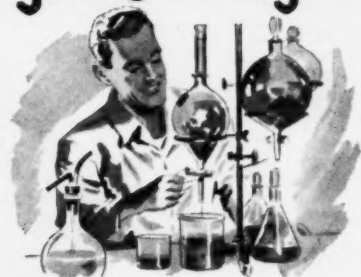
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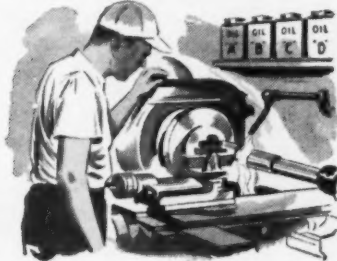
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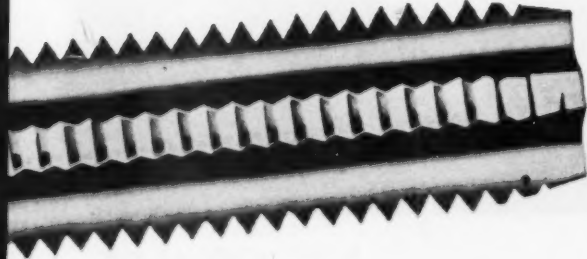


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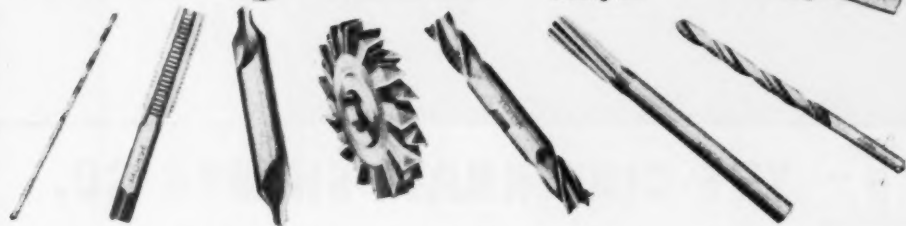
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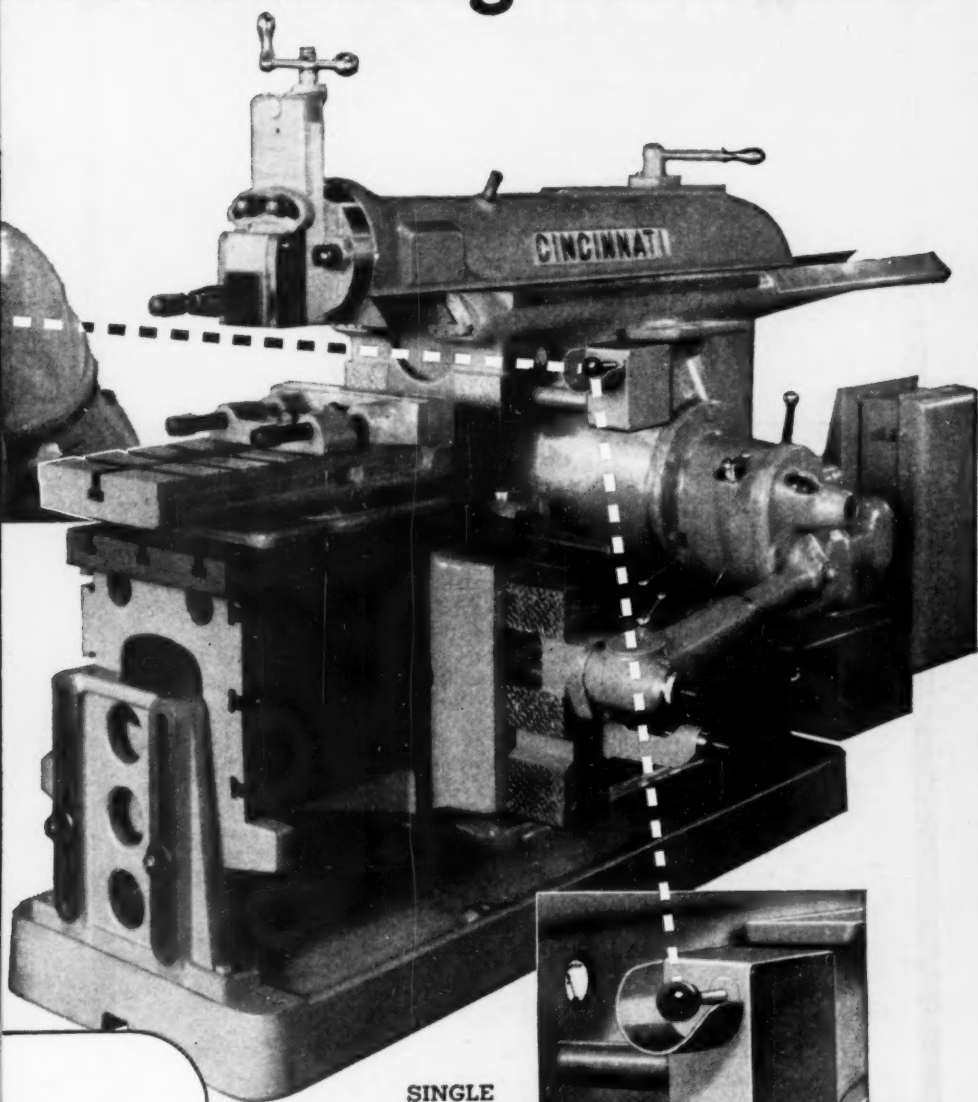


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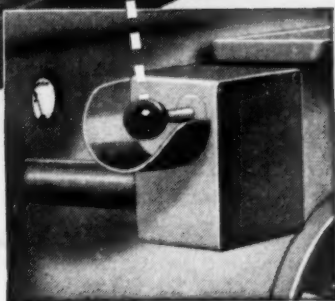
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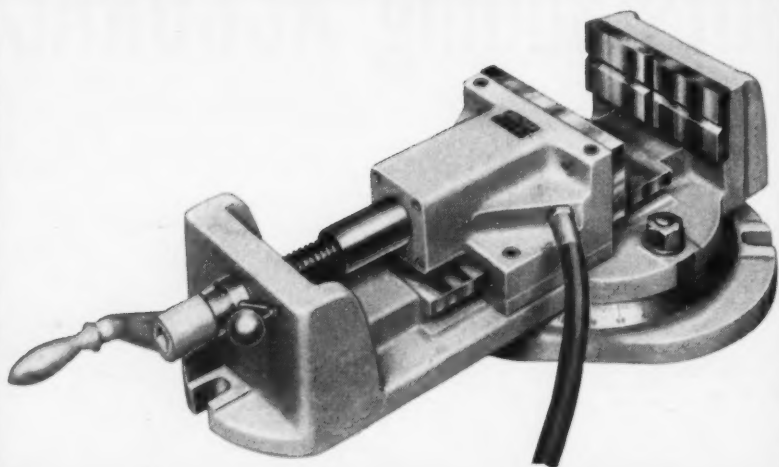
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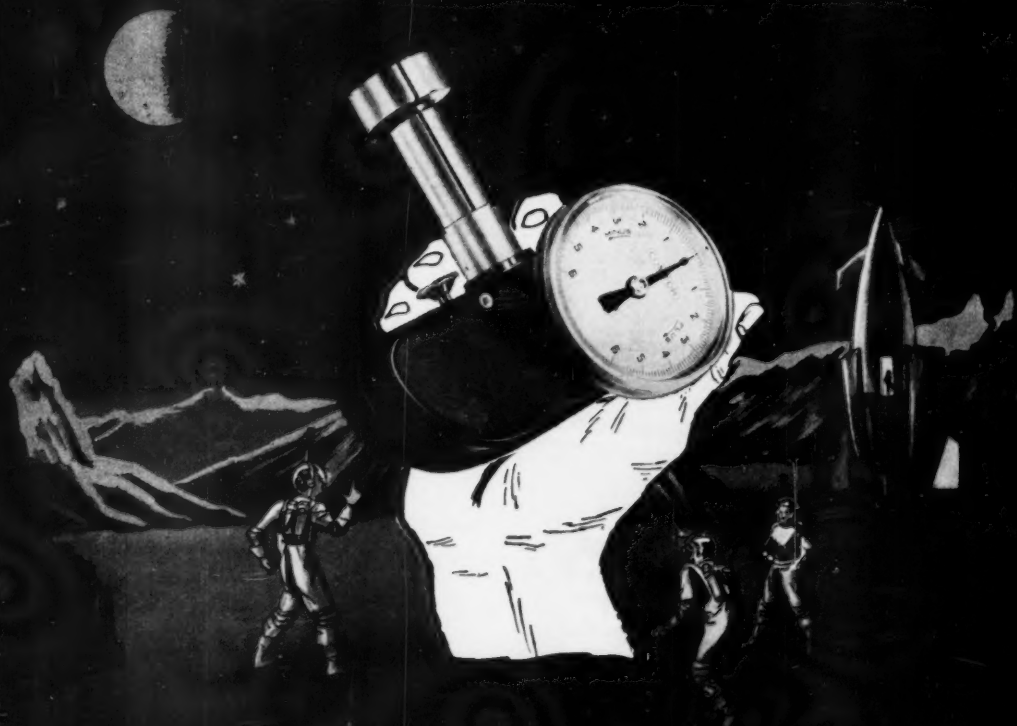
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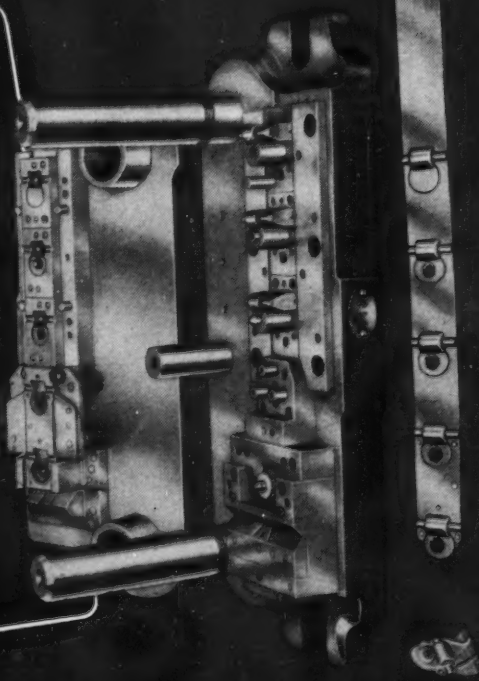
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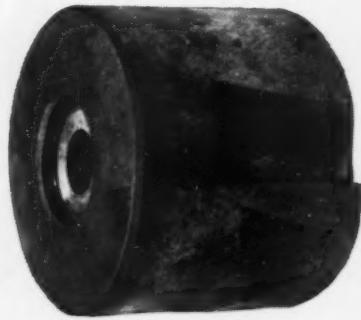


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...nationally known fastener manufacturer* recently made comparative tests of solid steel cold heading dies, under carefully controlled conditions, producing 1/2" square head machine bolts from 1020 steel on a Waterbury Farrel double stroke automatic.

Firth Sterling C.H.Q. came off with top honors and the highest production ever obtained by this manufacturer from any steel die... 192,045 both ends, (78,860 one end, 59 Rockwell C; 113,185 other end, 61 Rockwell C.) Standard competitive carbon steel dies produced only 50,000-60,000 both ends and ultimately failed by cracking axially. The C.H.Q. die wore oversize but longitudinally etched section revealed not even a hairline crack.

Ask for technical literature on C.H.Q.—or a Firth Sterling representative will discuss your die problems.

*(name on request)

R-29-A

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels

Tool & Die Steels

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Sintered Tungsten Carbides

Firth Heavy Metal

Chromium Carbides

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Now—Lock Your Feed Rates to Protect Machines . . . Reduce Costs with the **CROSS** Flow Control Lock!

Only authorized personnel carry a key for the Cross Flow Control Lock! They set machine feed rate, then lock it.

Easy to install. Just remove valve nameplate and adjusting lever, re-install over lock mounting plate.

Available for Vickers 1/4" flow control valves and remote control panels.

For full details, write Dept. A510.

- Eliminates Tampering
- Stops Costly Shutdowns
- Prevents Tool Abuse and Breakage
- Protects Machines Against Overloads
- Reduces Maintenance Costs

Established 1898

THE **CROSS** CO.
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Comparing
piece parts
with tolerance
drawings on
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Another Harig Car-
bide die designed to
out perform a com-
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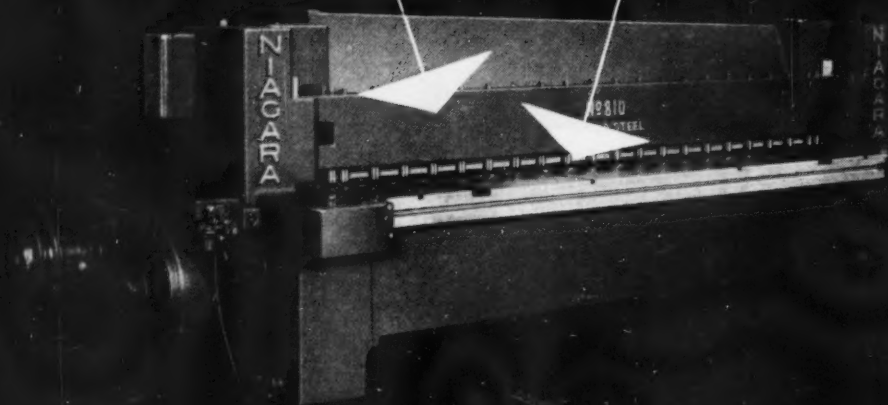
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For over a quarter century, Harig has provided America's metal working industry with the finest precision tools man can devise. Highly skilled craftsmen combine their total of more than 1000 years of experience to guarantee you quality that pays off in your production line.

Carbide, lamination, molding and stamping dies, gages, fixtures, jigs, or special machining — whatever your need, you can depend on Harig to deliver a built in bonus of excellence.

Harig

SELF-COMPENSATING HOLDDOWN



*America's most complete line of presses, shears,
machines and tools for plate and sheet metal work*

a BIG FACTOR in the superiority of Niagara Shears

"STRAIGHT-EDGE" CUTTING ACCURACY

Positive, power actuation grips work securely for maximum cutting accuracy.

LOW IMPACT AVERTS DAMAGE AND INACCURACY

Individual pressure feet contact work with low impact, thus safeguarding both the material and bed against damage, as well as reducing noise level. No hammer-blows to mar work. No peening of bed with resulting distortion of knife seat.

SIMPLIFIED, LOW UPKEEP DESIGN

Simplicity of design and construction, involving a minimum number of parts, assures negligible servicing. With *less* to go wrong, there is *less* to repair and replace.

HOLDS WORK FLAT AND STATIONARY

Multiple pressure feet on 6" centers, applying uniform pressure, hold work flat and tight against bed to assure utmost shearing accuracy. No rippling of sheet between feet as cut progresses. Firm grip on short pieces.

HANDLES STOCK OF VARYING THICKNESS

Individual feet are self-compensating, requiring no adjustment for cutting stock of different thicknesses . . . even at the same time.

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In a power squaring shear, no *single* feature nor component can be fully responsible for accuracy, speed and economy. They result from a *combination* of features such as the self-compensating holddown; rigid, fully closed box section construction of bed and crosshead; low slope of upper knife; ample and accurately held cross-head guides; multiple point sleeve clutch — the very features that have established the marked superiority of Niagara's Underdrive Series.

For the whole story, straightforwardly presented, on America's most complete line of underdrive power squaring shears, with capacities from shim stock to 1 in. thick mild steel (lengths 3 to 20 ft.), request *Niagara Bulletin 69*. Write today.



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...ACCURACY

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U. S. Vertical's balanced rigidity is the key to profitable production. Make the same comparison made by hundreds of plants. See why they find the U. S. Vertical to be the low-cost mill they demand. New "U. S." features include hard chrome plated quill, precision honed head and overarm bosses; and a quick change collet draw bar. Write today for complete details.

The U. S. Burke Machine Tool Division,
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"Accuracy Certified!"
Check list showing results
of actual inspection tests
accompanies each
machine.

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- Balanced head and motor
- Simplified belt-speed changing
- Conveniently located reversing switch
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- Guaranteed close tolerances*
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SPECIFICATIONS

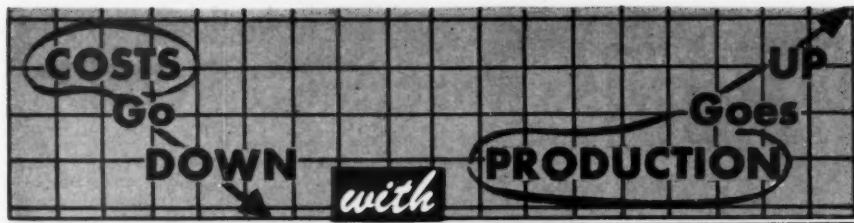
	U. S. VERTICAL	
Table Size	9 1/2" x 36"	
Longitudinal Feed	24"	
Cross Feed	9 3/4"	
Knee Travel	16 1/2"	CHECK THESE
Quill Travel	5 1/2"	AGAINST
Dovetail Depth	1 1/4" x 1 1/2"	ALL
Vertical Screw	1 3/8" dia.	COMPETITION!
Weight	1600 lbs.	
Table Power Feed	0" - 12" per min. (infinitely variable)	

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DELIVERY, too!

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addition permits
us to promise and
fulfill prompt
deliveries.

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OLIVER ACE Universal Tool and Cutter Grinders

Simple to set up, easy to operate, the OLIVER ACE handles a wider range of cutters than do ordinary cutter grinders, yet requires no computation. With the ACE, time lags are cut to the bone . . . the simplicity of design and operation make economy of motion and fast grinding certain. The time-proved, soundly engineered Oliver ACE effects economies in floor space and less outlay in dollars for this truly superior type machine.



Direct Reading for Clearance

- Reduces Fatigue
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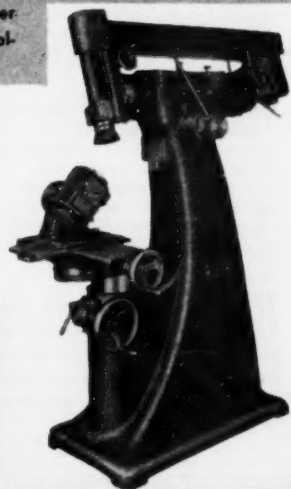
Especially qualified for grinding tungsten-carbide and high speed milling cutters and tools, the Oliver ACE has only one sliding part with ample bearing, efficiently protected from dust. Only two simple fixtures are required for a general range of cutters. Quick, accurate and easy . . . the ACE is maintaining its long-standing reputation in thousands of plants for doing the job for which it is built.

Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing and carbide tipped circular saws.

2 MODELS: Standard and Heavy Duty (illustrated)

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MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
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***GREATER VARIETY OF GRAIN-AND-TEXTURE COMBINATIONS.** Now available, this greater choice provides rubber-cushioned abrasives especially "matched" to your finishing requirements—**faster, finer work.**

UNBELIEVABLE WORKING-ACTION AND ADAPTABILITY. Brightboy's simultaneous abrasive-and-rubber action is not only a revelation in finishing but goes far beyond other methods in versatility and adaptability. It brings an entirely new and refreshing concept to finishing a wider range of metals.

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Also made in a full range of accessory products, wheels, sticks, rods and blocks for machine and manual operations.

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EITHER ALUMINUM
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can buy—yet
they cost no more

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*versatility
accuracy
economy*

another great new PLUS... The CLAUSING VERTICAL MILLER

Is NOW READY FOR YOU!

The new Clausing Vertical Milling Machine has more Plus Value features than have ever before been available in a miller at or near its price!

It has Versatility Plus! It is actually several machines combined in one. The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill, drill, bore, ream and shape at all angles, with one setup.

It has Accuracy Plus! The heart of the Clausing Mill is its rigid, high precision spindle head. It has 7 ball bearings—spindle is chrome nickel steel, hardened and ground—quill, hardened and ground, has honed bearing seats—overarm is rigid steel casting with $\frac{3}{4}$ " thick walls precision ground. All feed screws have ground threads, turn on ball bearings. Table surfaces and dovetail ways on table, saddle, knee and column are precision ground.

It has Economy Plus! The Clausing reduces setup and operating costs. It's low in initial investment, low in upkeep costs.

Write today for the complete story!

CONDENSED SPECIFICATIONS

Size of Table.....	6" x 24"
Longitudinal Table Travel.....	15"
Transverse Table Travel.....	5"
Vertical Table of Knee.....	12"
Maximum Distance Spindle to Table.....	12"
Maximum Distance Spindle to Column.....	8 $\frac{1}{2}$ "
Quill Travel.....	3"
Spindle Speeds: Six, 180 to 3250 R.P.M.	
No. 7 Brown and Sharpe or No. 2 Morse Taper Spindle Optional.	
Operates from $\frac{1}{2}$ or $\frac{3}{4}$ HP, 1725 R.P.M. Motor	

MILLS, DRILLS, BORES, REAMS AND SHAPES . . .
AT ALL ANGLES . . . WITH ONE WORK SETUP!

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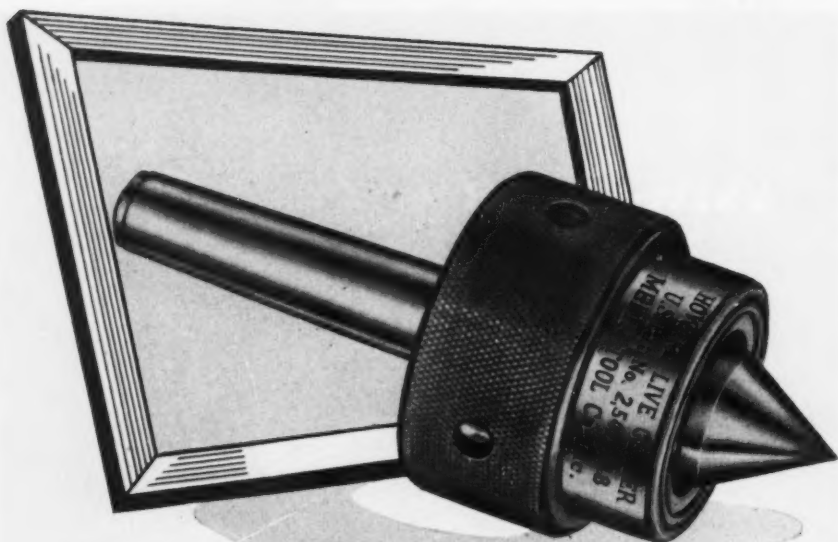


A NEW LEADER *in Precision Grinding*

*Boyar-Schultz
6-18 Hydraulic
Surface Grinder*

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Finest **LIVE CENTER MADE** ... HERE'S WHY

- ★ **BACK UP RING** assures positive rigidity.
- ★ **Bar Expansion Eliminated** by means of Thrust Spring.
- ★ **Special alloy tool steel spindles**, hardened and ground.
- ★ **Matched precision ball bearings**, mounted in tandem.
- ★ **Oil impregnated bronze tail bearing**.
- ★ **Points pre-loaded and ground** after assembly.

★ A distinctive oil seal in front of bearings protects them from all foreign matter. Chips, dirt and cutting oil cannot reach the bearings.

The **HOWARD Live Center** is the *ONLY* center that offers the patented **BACK UP RING**. The Ring maintains solid contact between the quill and head of the center . . . thus greatly increases over-all rigidity.

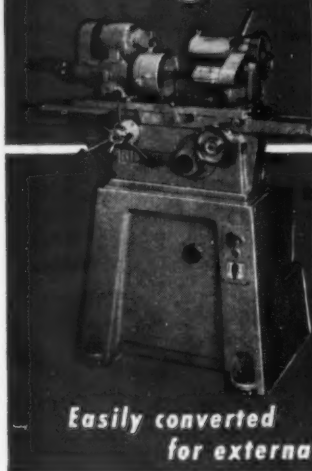
Send for the new **MELIN TOOL** Catalog No. 54-C . . . it lists, in addition to specifications and prices on the **HOWARD Live Center**, the complete **MELIN TOOL** End Mill Line.



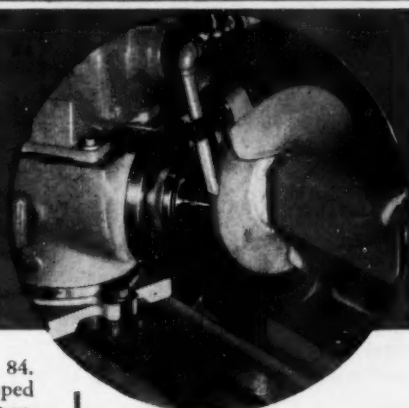
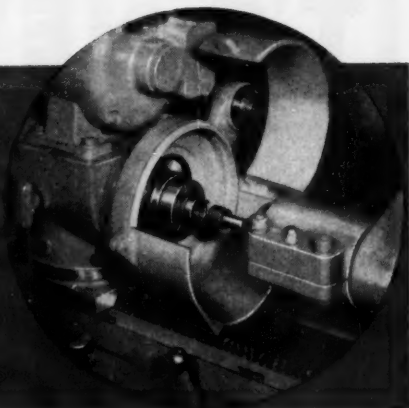
**MELIN TOOL
COMPANY, INC.**
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Cleveland 11, Ohio



A new small hole grinder



**Easily converted
for external grinding**



Flexibility keynotes this new Rivett Model 84. Primarily a small hole grinder, it may be equipped for external grinding. Simplicity reduces set-up time on the variety of work normal to the tool-room and die shop. Collets and step chucks quickly mount single or repetitive pieces.

The new Rivett 84 grinds holes from the smallest up to 3" diameter, with a maximum 4" depth depending upon diameter; external work to 3" diameter by 4" length.

If you need versatility with extreme accuracy, you will want to learn more about this new grinder. Send for Catalog 84.

FEATURES

- ★ Optional Wheelheads for internal and external spindles.
- ★ Internal Spindles 12,000 to 35,000 r. p. m. Sealed from grit. Pre-lubricated.
- ★ Workhead Spindle mounts draw-in collets and step chucks directly.
- ★ Micrometer Table Stop for positioning work when shoulder grinding.
- ★ Mechanical Power Table Travel with infinite adjustment of speed and stroke.

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Newest MILLERS FALLS cost-cutting tool for industry

This rugged, high-production tool cuts sheet metal — up to 16 gauge (.060") in steel and galvanized sheet — up to 50% greater in aluminum, copper and other non-ferrous metals. Blade adjustments are quickly made — with hex keys conveniently located in tool handle.

In power, in quality, in design, the new No. 16 Portable Electric Shear is an outstanding addition to Millers Falls line of electric tools for production and maintenance. Write for full details on Millers Falls high-performance, advanced-design electric tools. Demonstrations quickly arranged on request.

MILLERS FALLS COMPANY
Dept. MT-4, Greenfield, Mass.



On straight lines or curves, from inside or outside, Millers Falls new No. 16 Portable Electric Shear cuts clean and fast. Weighs only 8 lbs. Minimum radius for left hand cuts is $\frac{1}{2}$ ", for right hand cuts, $1\frac{1}{4}$ ". High cutting-line visibility. Precision-ground, heat-treated alloy steel blades are quickly removed for resharpener. Built to Millers Falls quality standards, the No. 16 Portable Electric Shear is the latest star in a notable line of industrial electric tools.



The Mark of Superiority

For cutting everything

BARS - Rounds - and Pipes

fast, accurate, and economically

it's

KELLER

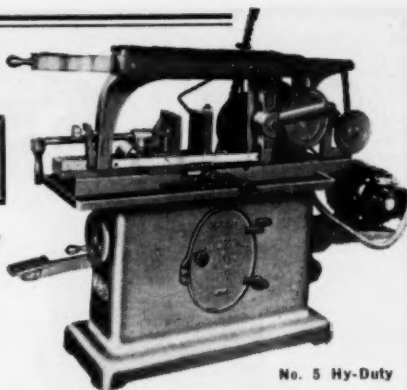
POWER HACK SAWS

Capacities $3\frac{1}{2}" \times 3\frac{1}{2}"$ to $9" \times 9"$

Reduce your cutting costs. Let the simple, efficient design of nine Keller Power Hack Saw models give you maximum output at a minimum investment.

More features you want from the smallest to the largest capacities to give you lower operating and maintenance costs and longer blade life.

Keller Power Hack Saws are the choice of thousands. Investigate and you will find a Keller to meet your requirements. Write for illustrated bulletin and low prices today!



No. 5 Hy-Duty



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Sales Service Machine Tool Co.

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A Standard Machine Designed for Variety Production

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Any number of drilling units up to eight may be employed, the units being movable not only through 360 degrees on the circular table but also movable endwise on riser plates to meet the requirements of the part being drilled.

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If you are interested in reducing the cost of your radial drilling and tapping operations, write for price and dimensional data.

WRITE FOR
Literature

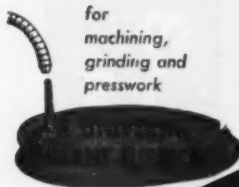
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TOOL LIFE BOOSTED 60 to 80 % WITH **SHEAR-SPEED SOLUBLE OIL** !

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gears for
a large auto
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Convince yourself of the amazing advantages and versatility of SHEAR-SPEED Soluble Oil in your own plant. Sold only on a satisfaction guaranteed test basis. Write for Bulletin SO-33 and price list.

IMPARTIAL TESTS of two highly-rated cutting fluids vs. SHEAR-SPEED Soluble Oil were run under exactly similar production conditions: same machine, same parts, same cutting speed, same coolant flow, same tool grinding

	Cutting Fluid X	Cutting Fluid Y	SHEAR-SPEED Soluble Oil	5/5 Soluble Oil Gave This:
Average No. gears cut per grind	177.6	193	228	More pieces per grind
Tool stock removed per grind	.0227"	.0288"	.0188"	Less tool wear
No. of grinds per .375" hob wear	16	13	20	Longer tool life
Average tool life	2842 parts	2509 parts	4960 parts	Lower tool cost per piece

SHEAR SPEED
CHEMICAL PRODUCTS

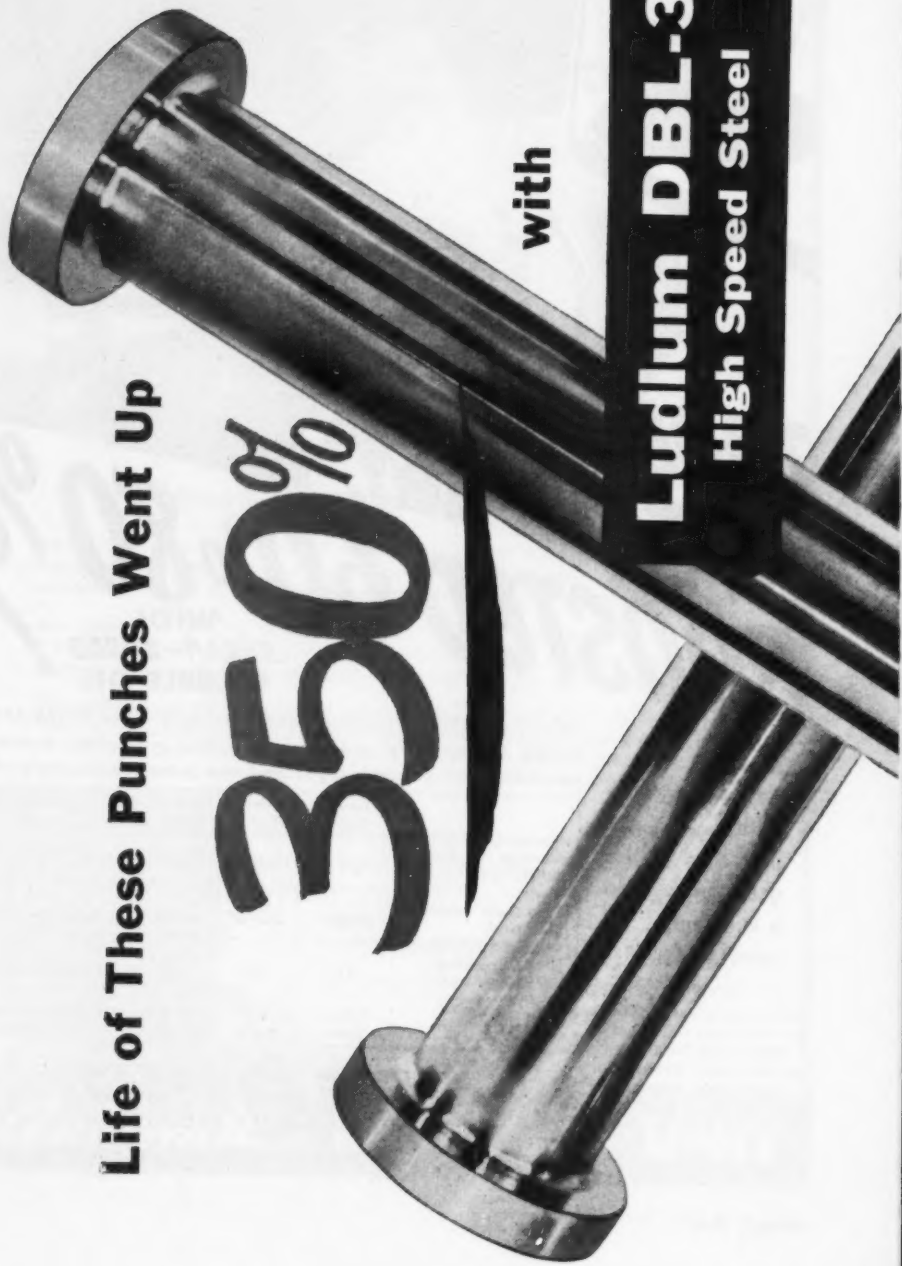
7175 E. McNICHOLS RD. A Division of Michigan Tool Co. DETROIT 12, MICH.

Life of These Punches Went Up

350%

with

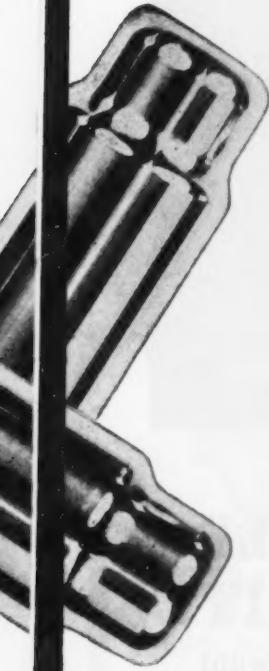
Ludlum DBL-3
High Speed Steel



Application of

Special Heat Treatment

Did the Trick:



These DBL-3 punches (27/8" dia. by 10 1/2" long) are used to draw and flatten hot or cold rolled stock .140" thick. With conventional heat treatment, their performance was 25% better than Material B and 50% better than Material C. But A-L Metallurgical Service recommended the *additional* heat treatment listed below, improving the performance of DBL-3 to 150% over B and 350% over Grade C!

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2. Oil Quench
3. Draw at 1025°F
4. Draw at 1025°F again
5. Finish grind
6. Draw at 750°F to relieve grinding stress
7. Nitride 72 hours at 950°F (case depth of approx. .015)

Ludlum DBL-3 holds a fine grain over a wide hardening range. With its higher carbon and vanadium content, it also has better abrasion resistance than other standard high speed tool steels. Our Metallurgical Service is ready to help improve *your* production operations, too. Just call our nearest branch office, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.*

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your copy of
"CUTTING
TOOL
MATERIALS"



This 36-page booklet analyzes and compares all A-L grades: carbides, high speed, cast alloy and tool steels. Includes data on handling and treatment ... invaluable for production men.

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FIXTURE

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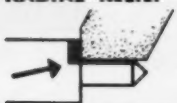
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ROYAL OAK, MICH. 48067



*You'll
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VICTOR
BLADES

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Victor "Moly"* High Speed Steel—Challenges all comparison as to economy and performance.

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Illustrated, Model 4095-4-way, 2-position valve for directing pressure alternately to ends of double-acting hydraulic cylinder.

A broad range of types and sizes to most effectively meet any requirement—Design Engineers, Machine Operators, Maintenance Men appreciate these Logan advantages

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Let Logan Engineers help you
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Illustrated, Model 6015 adjustable speed control valve. Install between operating valve and one of cylinder to meter flow of oil in one direction with free flow on return.

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first name in special purpose steels

54 years of *Fine* *steelmaking*

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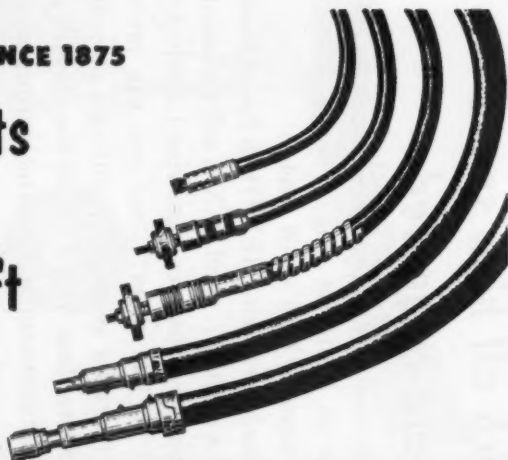


JT 38—Jiffy
Tool. Constant
speed machine.



N40 Streamliner—One of
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flexible shaft machines.
Write today for Cata-
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30 Shear St., Binghamton, N.Y.



8 compelling reasons why you should do business with STOW:

1. **DEPENDABILITY**—Stow Engineers are flexible shaft specialists.
2. **EXPERIENCE**—Stow is the oldest and largest producer of flexible shafting in all sizes.
3. **COMPLETE SIZE RANGE**—From $\frac{1}{8}$ " to $1\frac{1}{2}$ " cores—up to 1500 lb. in. for power drives or 4000 lb. in. for remote control.
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5. **FOUR STANDARD** types of cases. Special cases can be furnished to meet your requirements.
6. **LARGE VARIETY** of standard terminal parts available.
7. **SPECIAL** terminal parts can be made to your specifications.
8. **ENGINEERING SERVICE**—Your inquiry will receive prompt and careful consideration by TOP flexible shaft engineers.



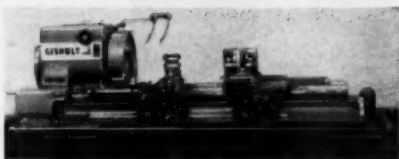


**"Here's why GISHOLT insists upon
the HEAVIEST CASTINGS!"**

Look at them . . . castings for the heaviest saddle type turret lathes in the business! Look at all the angles:

First, note how the headstock is cast integrally with the bed for perfect spindle alignment . . . how cross supports give the most solid base for carriages, tools and slides . . . how extra-heavy webbing gives the headstock the ruggedness to support powerful gear train members.

Remember, too, that cast iron absorbs vibration. The heavier the better! And Gisholt controls the quality of the finest nickel semi-steel in its own foundry.



The Gisholt 5L Saddle Type Turret Lathe has a net weight of 22,500 lb. without equipment.

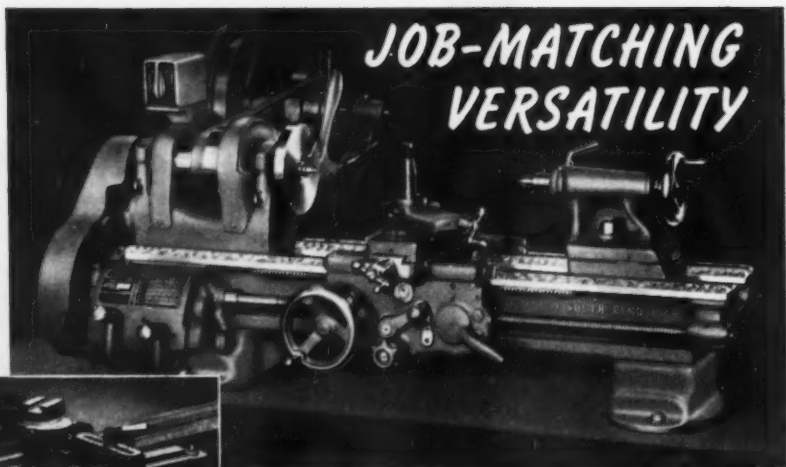
What does it mean to you? You can load up your Gisholts with carbides and really turn out the chips! You've got the strength, the rigidity and the freedom from vibration to take all the speed you can get from today's carbides—with the heaviest feeds—and still have the safety margin to take care of tomorrow's tool bit developments.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

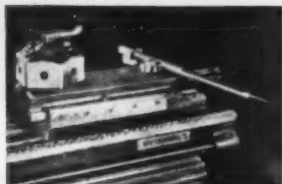
THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



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TAPER ATTACHMENT



HANDLEVER BED TURRET



SQUARE TURRET TOOL BLOCK



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Here's a lathe that cuts machining costs on small precision parts. Its wide ranges of speeds, power feeds and threading feeds provide versatility for practically every job. Numerous job-simplifying attachments make the scope of its work even greater. This enables you to better match the lathe to your jobs. It results in faster operations, greater accuracy, quicker set-ups and the release of heavier machines for heavier work.

Write for catalog or call our distributor listed under "Machine Tools" in your classified telephone book.

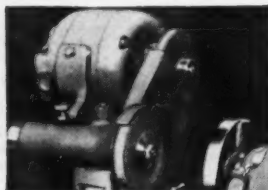
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9" x 3' Model A 12-speed Bench
Lathe. Less electrical equipment.
F.O.B. factory.....

\$385

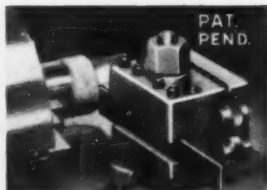
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Building Better Tools Since 1906

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EXTERNAL GRINDER



UNIVERSAL TOOL BLOCK

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To assure you of the finest, special care is taken to each important feature of American Drill Bushings. One of the most important features is the hole. At American the holes are internal ground for a true, straight hole. This perfect hole prevents drill wear and tool breakage. It also insures perfect alignment to the hole to be drilled, and furnishes a perfect axis for altering the outside diameter of the bushing for special operations.

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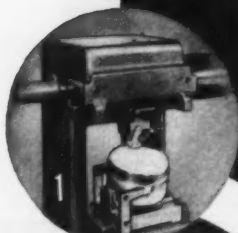
American

DRILL BUSHING COMPANY 5107 Pacific Blvd., Los Angeles 58, Calif.

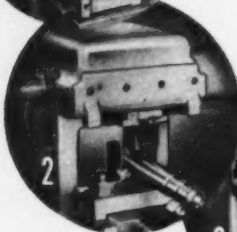
Specializing only in Drill Jig Bushings--Look for the trade mark



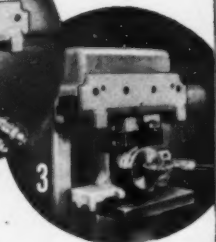
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Versatile
MARKING
MACHINE
ever built



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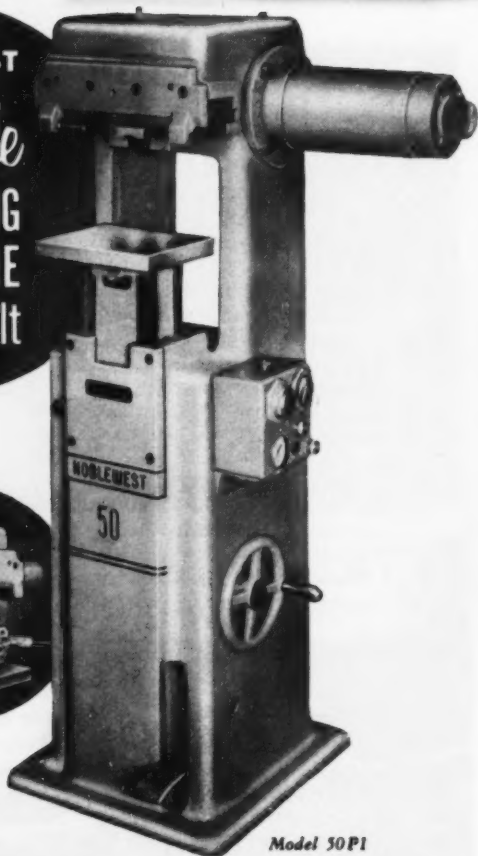


2



3

- 1 Roll-Marking into Surface of Piston
- 2 Serial Numbering into Metal Shaft
- 3 Permanent Marking and Graduating into Metal Collar



Model 50P1

ROLL-O-MARK

Multi-Purpose

All-Pneumatic

MARKING MACHINE

Whatever your needs for metal marking, Noblewest makes the machines, marking dies, and work-holding fixtures for doing the complete job faster, better, at lower cost. And remember, Noblewest Roll-Marking is *permanent marking—good for the life of your product.* Write Noble & Westbrook Manufacturing Company, 25 Westbrook street, East Hartford 8, Conn.

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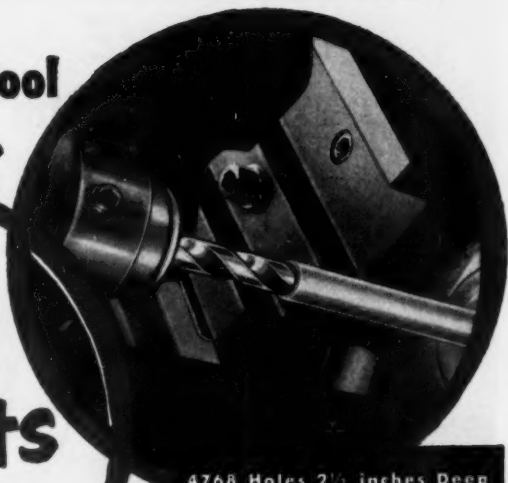


MARK IT BEST WITH
NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS

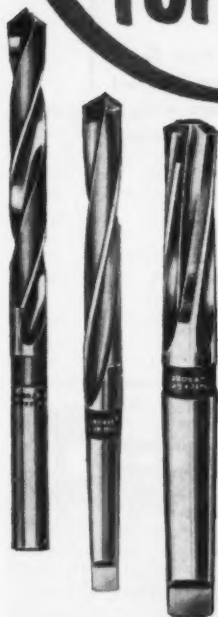
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Carbide-Tipped Tool
performance...

means
**lower
tool costs
for you!**



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Drilled in Valve Guides

"993 feet of Drilling"
Before Resharpening



**DOUBLE-CIRCLE Carbide Tipped
Tools Give Greater Cutting Mileage**

● DOUBLE-CIRCLE Tools are manufactured with extreme care by Chicago-Latrobe engineers all the way from raw steel to the finished product. They make sure Carbide Tipped Tools have ample metal backing of carbide insert. Inserts are checked to "close-limit on analysis" specifications . . . bodies are hardened high speed steel. This results in a high quality tool that gives long life . . . cuts fast . . . smoothly . . . easily . . . and gives greater cutting mileage.

The wise buyer of tools, interested in stretching dollars, will profit by specifying DOUBLE-CIRCLE. Send for descriptive data and specifications—ask for booklet No. 186.

YOU'LL GET  **QUICK SERVICE** 
FROM A CHICAGO-LATROBE DISTRIBUTOR



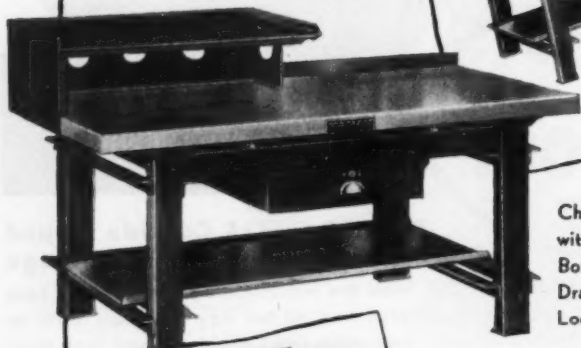
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3 Styles - 4 Sizes

All with durable 2-inch warp-proof, shrink-proof, fire-proof cast-iron top. All have leveling screws. All built to a high standard of Quality.



Challenge Work Bench
with tool box shelf.

Challenge Work Bench
with Cast-Iron Top, Tool
Box Shelf and a Steel
Drawer with Pilfer-Proof
Lock.



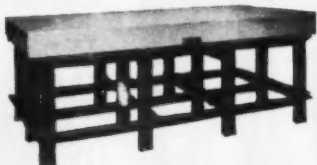
Challenge Work Bench
without shelf or drawer.

TOP SIZES

4 Legs	6 Legs
28x48x2	28x72x2
28x60x2	28x84x2

Semi-Steel

LAYOUT SURFACE PLATE for layout, inspection or assembly lines. Available either precision ground or planer finished. Sizes from 12x18" to 54x144".



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here's
your
most
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grinding
machine!



Only type on the market with 4 and 5-SPEED GEAR DRIVES

Famous Strandflex 4 and 5-Speed Gear Drive Machines mean faster speed selection from direct drive head, no countershafts. No changing pulleys or drive belts. No tools needed. Select operating speed with little more than the flick of a finger.

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Easier to use because Strand Quick Change Coupling lets you change tools in seconds without using wrenches. Special locking button requires only a simple PRESS - PULL - SNAP! And remember, with Strand, the operator lifts the tool only—not the heavy motor.

Full Strand line includes direct drive and countershaft machines up to 3 HP. Also complete line of accessories and tools. Find out today how these versatile production tools can help you boost production without investing in high cost, high maintenance equipment. See your Strand Distributor . . . or write direct to us for catalog 231A.

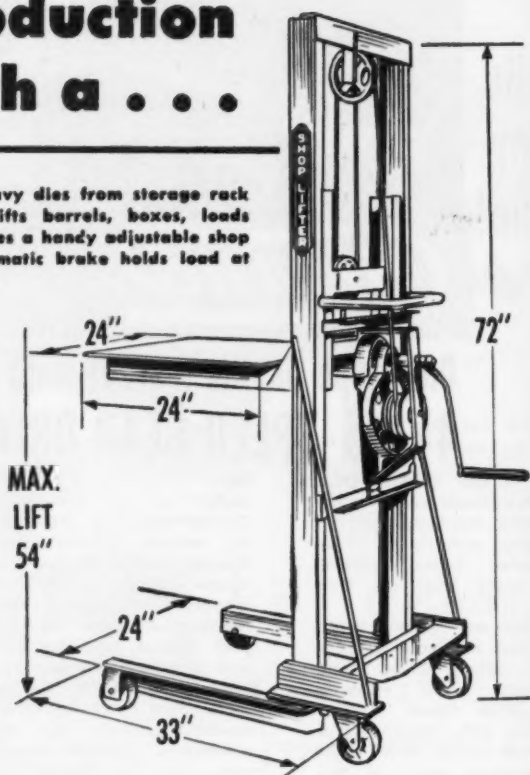
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Five operating speeds. $\frac{3}{4}$ or 1 HP
motors. Strandflex patented
gear head drive. Plenty of power
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Cut accidents Increase man hour production with a . . .

Handles heavy dies from storage rack to press. Lifts barrels, boxes, loads trucks, makes a handy adjustable shop table. Automatic brake holds load at any height.



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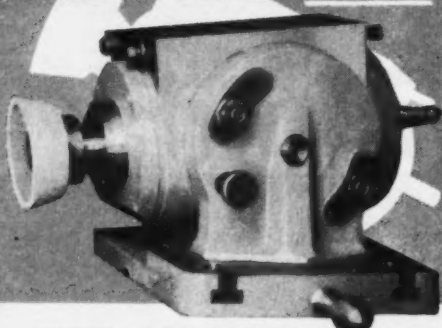
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4505 W. Lake St., Chicago 24, Ill.

SHOP-LIFTER

HERE'S A HEAD THAT TILTS

*and Yours Will Nod, Too
When You See What
You Can Do With This
One*



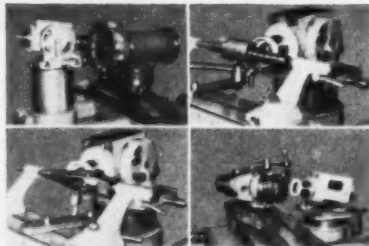
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**SUPER PRECISION 1 HP,
3600 RPM MOTORIZED TOOL AND CUTTER GRINDER
CLEARANCE ANGLE SWIVELLING HEAD**

With Angular Adjustment In A Vertical Plane

Give this versatile head the nod and save time and money these seven ways:

1. You can use cup wheels for practically all clearance angles and thus produce a cutting edge on tools that lasts longer because it is stronger.
2. You can keep the tooth rest on the center line of the cutter for practically all grinding on centers or in the work head.
3. You can grind most cutters and reamers all over with a single set-up using the swivelling table and Pope tilting head.
4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
5. You can get the right clearance angle on such tough grinding jobs as slab mills, taper reamers, angular cutters and form tools.
6. You have one safe speed — 3600 RPM — for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
7. You have a head that's so easy to adjust and use it saves you time and money every time you grind a tool.



Ask us to submit complete specifications including price and delivery.

No. 101

Specify

POPE

PRECISION SPINDLES

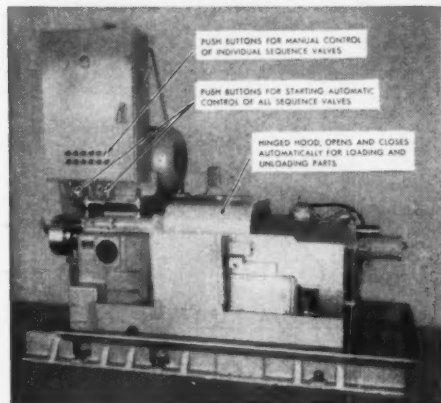
POPE MACHINERY CORPORATION

Established 1920

251 RIVER STREET • HAVERHILL, MASSACHUSETTS

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

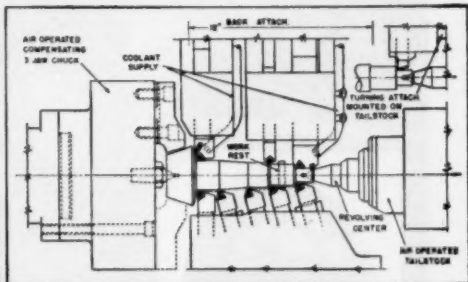


Lo-swing LATHE EQUIPPED WITH AUTOMATIC CONTROLS REDUCES HANDLING TIME...

Problem: To reduce handling time and operator fatigue in machining operations on Axle Pinions.

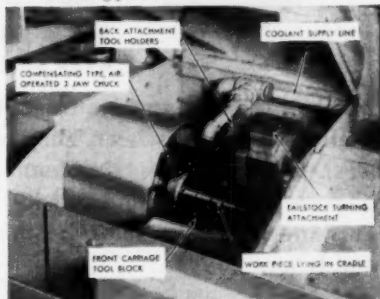
Solution: A Model AR Automatic Lo-swing Lathe, tooled as illustrated, was selected for this job. Work is held on centers and driven with an air-operated, three-jaw compensating chuck. Five carbide front turning tools, two of which are template operated, reduce the length of cut to 1-7/8", which is the length of the taper portions. An additional tool, mounted in a tailstock turning attachment, partially removes surplus material on the threaded diameter in advance of the front turning tool which finish turns this diameter. Six carbide tools on the rear slide face and chamfer the shoulders.

The machine stops automatically at the end of the cycle with spindle stopped, chuck jaws released, tailstock center retracted, hinged hood open and with the machined part dropped into a cradle. The operator simply replaces the finished part with a rough forging and then pushes the two starting buttons, energizing the loader controls, which consecutively close the hood, places the work between centers, closes the



Tooling area of machine is entirely enclosed, protecting operator from flying chips and coolant.

Hinged hood in open position for loading and unloading parts.



chuck jaws and finally starts the headstock spindle rotation. The automatic cycle from then on is controlled by automatic camming built into the base machine.

The tooling area of the machine is entirely enclosed to protect the operator from flying chips and coolant, while cutting at high spindle speeds. Two starting buttons, wired in series, oblige the operator to use both hands, and are so located that the operator is out of range of the closing hood, thereby preventing accidents.

Control buttons on the door of the starter panel permit normal operation of individual controls and are convenient for setting up and timing loader movements.

Seneca Falls engineering staff is at your disposal to help solve your engineering problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing



FAST CUTTING..SAFE..LONG LASTING **MANHATTAN MOLDISCS**

Manhattan Moldiscs give clean, fast cutting action right down to the last usable part of the wheel. They will not load or glaze when grinding mild steel, stainless alloys, aluminum or copper. Manhattan Moldiscs are safe because they are reinforced for breakage resistance. Both roughing and finishing operations may be done with the same Moldisc, saving time and labor.

Actual tests show that Manhattan Moldiscs outlast 25 to 30 coated sanding discs, with additional savings in down-time normally required for disc changes. Made in various resiliencies and bond types. For "MORE USE PER DOLLAR," specify Moldiscs and other types of high speed, heavy duty Manhattan Abrasive Wheels.



RM-437-R

WRITE TO ABRASIVE WHEEL DEPARTMENT



MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

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Carburs

ROTARY FILES THAT OUTLAST STEEL FILES 50 TO 100 TIMES LONGER



In sizes from
1/8" to 1 1/2"

An invaluable replacement for hand files and grinding wheels. Carburs cut easier and faster; stay sharp; hold their form. They reduce burring time, filing and cutting time—and generally increase efficiency in these operations in all types of production.

The first carbide rotary files ever to be produced. Send for new catalog showing specifications of all sizes.

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CARBURS cause less replacement and permit lower inventories.

CARBURS stay sharp—cut easier—reduce operator fatigue.

CARBURS cut faster—can be run at higher speeds.

CARBURS produce more work—quicker.

CARBURS hold their form—do not break down.

CARBURS produced by the originators of carbide rotary files.

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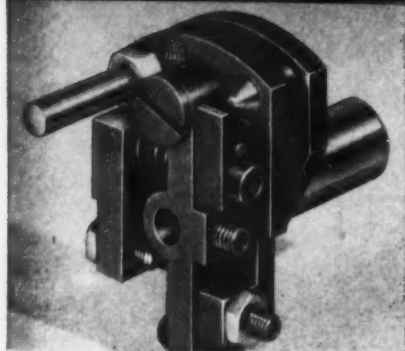
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October, 1954



The most compact
recessing tool available ...



AMCAM

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with exclusive **RADIAL ACTION**

Now makes possible Radial Recessing, Form Recessing or Back End Chamfering

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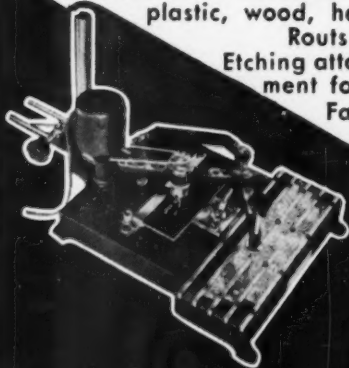
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Routs Models Profiles Engraves
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MODEL SG

for Wet* or Dry Grinding!

PRECISION • SPEED • SENSITIVITY

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

- Grinds to less than .0001" tolerances
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

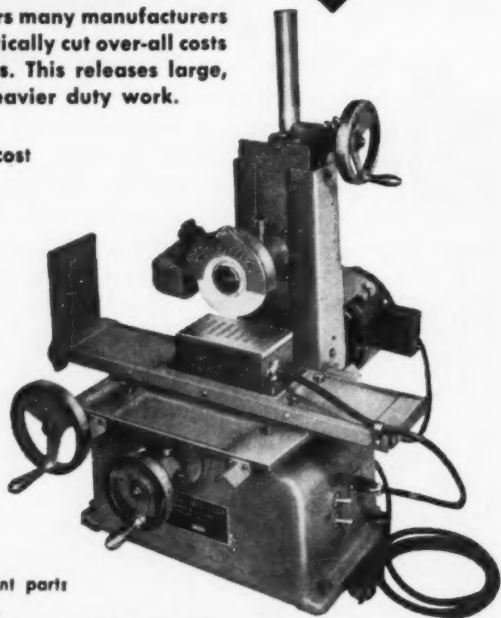
SPECIFICATIONS

—4" traverse
—8" longitudinal—6" vertical
under 4" wheel. Approximate
weight 160 lbs.

Complete details are included
in illustrated bulletin.

Send for your copy today.

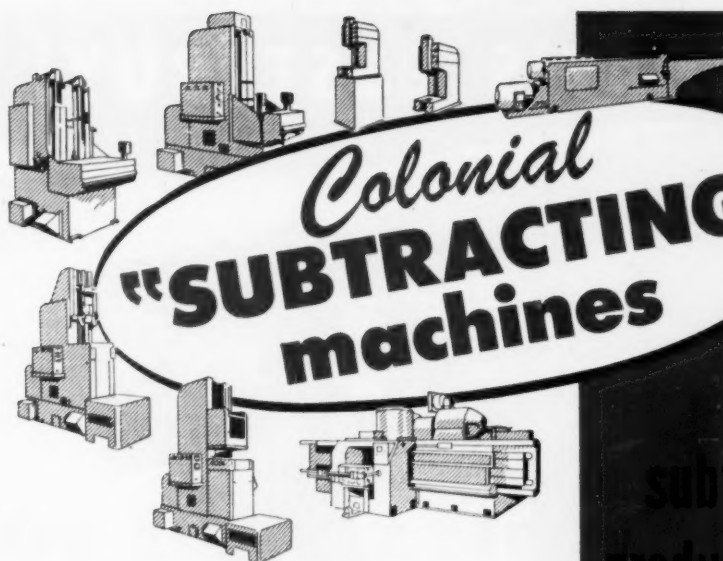
Reconditioning facilities, replacement parts
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Send for price list.



*With optional equipment

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1026 Commerce Ave., Union, N. J.



Subtraction #1—the Broach. With the Colonial broach designed specifically to broach the part efficiently to the tolerances specified at the required rate of production, cost subtraction starts.

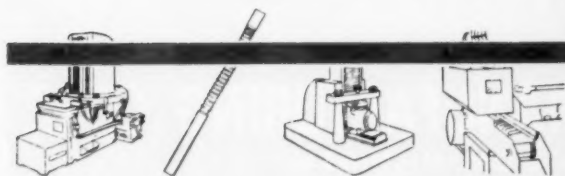
Subtraction #2—the Machine. Selecting one of the more than 60 dependable Colonial broaching machines capable of handling the broach at the specified rate of production is the next important step in subtracting costs.

Subtraction #3—the Fixture. The Colonial fixture, locating and clamping the part in broaching position, while at the same time permitting maximum accessibility for loading and unloading, is another important step in cost subtraction.

Subtraction #4—the Automation. Where high production requirements make loading and unloading time an important factor, the Colonial automation of the broaching installation will serve to further subtract machining costs.

ADDITION—By adding the four important Colonial cost subtracting features above, today's cost conscious metalworking plant has a complete *Colonial Unified Broaching Installation* capable of producing the part at lowest possible cost with utmost accuracy. To subtract costs and add to profits in your plant, ask Colonial Broach to quote on Unified Broaching installations for your parts.

Ask for bulletin 877 on complete line of Colonial broaching machines



they
subtract
production
costs
... add
to
profits

Unified Broaching



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JOHNSON Model B

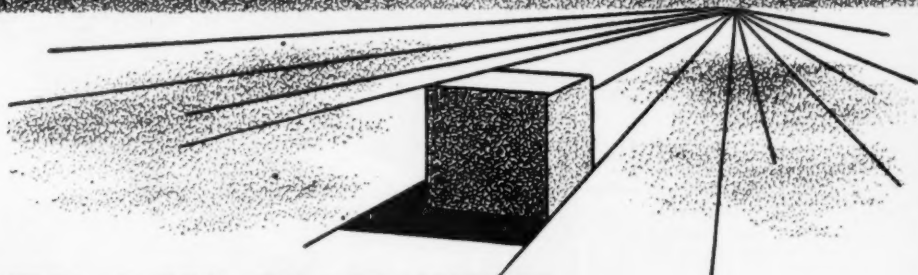
A full 5" x 10" capacity, low cost, handy saw for use in both small and large plants. Get details. Write today.

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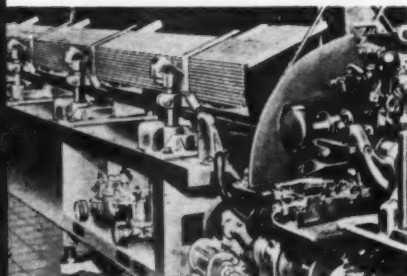
Through the 4th Dimension Time Barrier to New Production Highs



LIPE AML BAR FEED

gears machine production to the steady flow of Time

All industrial results are achieved in Time . . . vital 4th dimension that measures output, costs, profit. Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . and you are getting 4th Dimension production. Production that is geared to the steady flow of Time.



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Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

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High speed medium-light operation.

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Fits milling machines with overarm 1 1/2" to 3".

3/8" end mill capacity.

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Fits milling machines with 3" to 5" overarm.

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For vertical, horizontal and angular operations.

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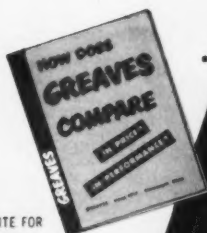
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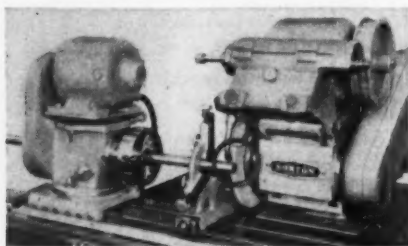


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CHART •

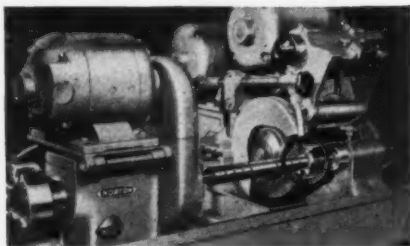
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He can change-over fast from this internal grinding set-up on the Norton 10" x 20" Universal grinder. The internal grinding spindle, permanently hinged to front of wheel side, swings up out of the way — and he's ready for external, face or angular wheel slide jobs.



Hollow spindle in headstock allows work up to 1" diameter and longer than machine to be passed clear through.



Dead center grinding — note chuck mounted at opposite end of head, a real set-up time saver.

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*increase
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*Norton 10" x 20" and 10" x 24" Universal Grinding Machines
are famous for versatility, accuracy and fast, smooth performance*

Do you want to save valuable time on many grinding jobs? Want a multi-purpose machine for rough cuts or finest precision finishing?

Then you want the Norton 10" x 20" or 10" x 24" Universal Grinder . . . that helps you produce more work at less cost.

The Norton 10" Universal is a multi-purpose grinding machine that can do external, internal, face and angular wheel-feed grinding.

Head and footstock are interchangeable, permitting simplified set-up on jobs involving shoulders or spacers, especially an angular grinds. Set-ups are made easier on chucking jobs by the D1-3" camlock nose on one end of the headstock spindle, and the provision for permanent chuck mounting. The headstock is easily swivelled 180° to change from dead center to chucking work.

The wide versatility of this machine proves once more that you economize when you modernize with a new Norton machine. For complete information see your Norton representative or write for Catalog 170-3. NORTON COMPANY, Machine Division, Worcester 6, Mass.

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NORTON

GRINDERS and LAPPERS

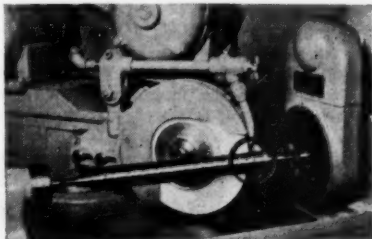
Making better products . . . to make other products better

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Norton 10" x 20" Universal Grinding Machine. Wheel head swivels 360°. Internal spindle hinged to front of slide and swings up out of way when grinding external work.



Head and footstock are reversible. No need to change wheel and drive to the other end of spindle.

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for driving
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HEAVY DUTY
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Again—Apex screwdriver bits have been **proved** better, outperforming competitive bits by a margin considerably better than two to one. This impartial test was conducted over a two-month period by one of the nation's largest producers of automobiles. The Apex bits used in the test were standard production bits, taken from tool crib stock. Detailed records of performance proved Apex bits outlasted others on the basis of hours used.

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Catalog 21—The authority on screwdriving

Comprehensive listings of all Apex production screwdriving tools, with complete specifications and prices. Fully illustrated and sectionalized for quick, easy reference. Write, on your company letterhead please, for your copy.

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Project: To determine which Phillips screwdriver bit delivered the most efficient performance, at lowest tool cost.

Duration of Test: Two months.
Type of Test: Routine production screwdriving operations.

Results of Test: APEX screwdriver bits outperformed other bits by better than two to one.

Conclusion: Continued use of APEX bits recommended for all production screwdriving operations.

APEX TOOLS

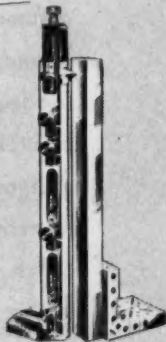
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Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes

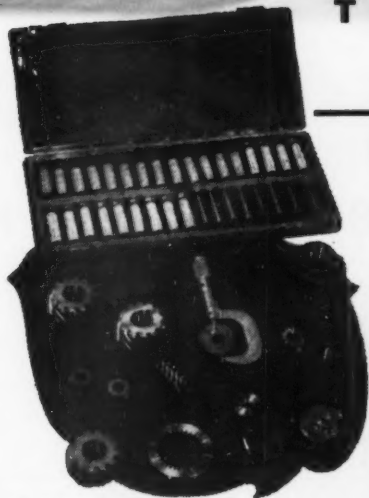


capacity tables, dimensions and complete specifications.

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- . . . table of relationships between depth of cut and tooth thickness for common pressure angle gears.
- . . . definitions and exact formulas covering involute spur gears.
- . . . tables of involute tooth parts

for standard addendum and stub tooth involute gears.

. . . information, formulas and examples regarding the wire measurement of helical gears.

. . . information and examples concerning the wire measurement of enlarged pinions and reduced gears.

. . . tables of wire measurement for involute splines.

. . . tables of wire measurement for involute serrations.

. . . tables of comparative measurement over three sizes of wires for use in involute profile checking.

CATALOG and HANDBOOK No. 35 is available without charge by writing to: The Van Keuren Co., 177 Waltham St., Watertown, Mass. Ask for your copy.



THE *Van Keuren* co.,

177 WALTHAM STREET, WATERTOWN, MASS.

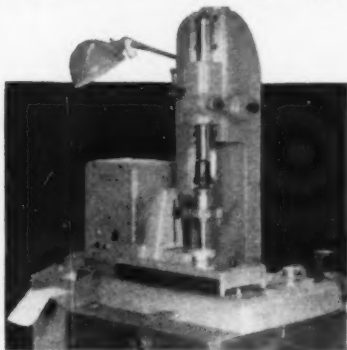
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GEAR COSTS

FOR CHECKING INVOLUTE PROFILES

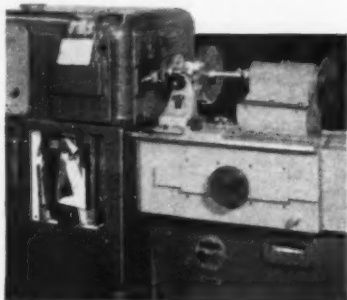
Two Fellows Involute Measuring Instruments with capacities of 12 and 24 inches p.d., electronic recorders, chart readings at 500 to 1 magnification.



✓ ✓ ✓

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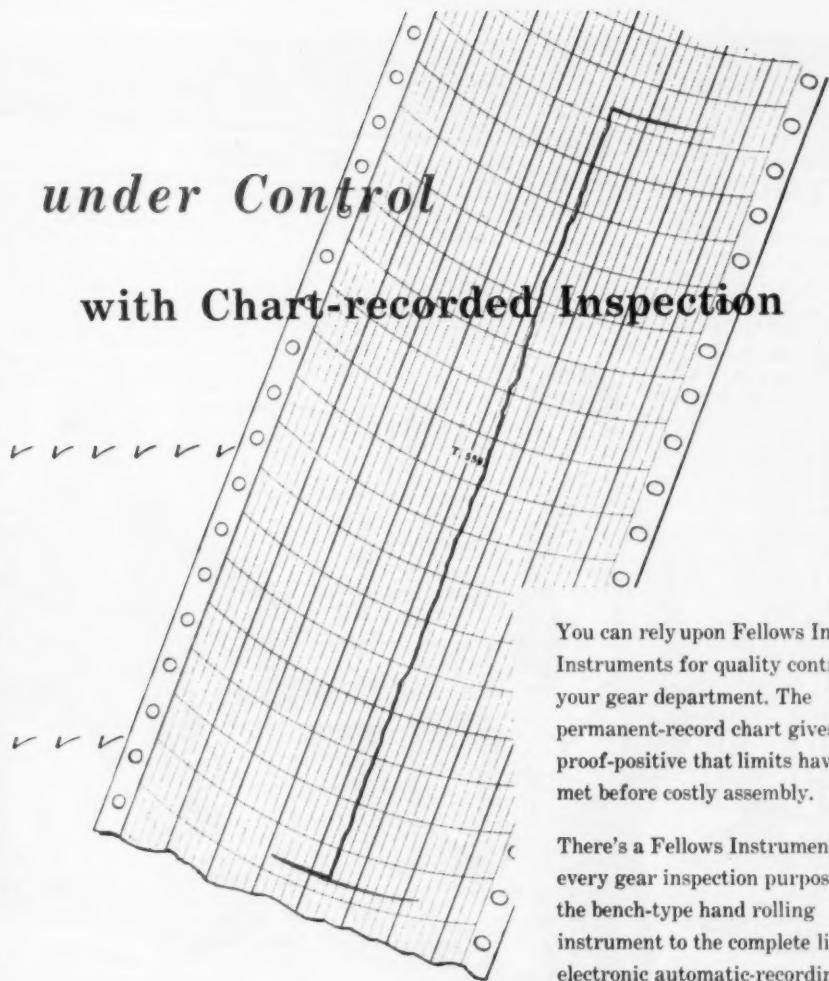


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with Chart-recorded Inspection



You can rely upon Fellows Inspection Instruments for quality control in your gear department. The permanent-record chart gives proof-positive that limits have been met before costly assembly.

There's a Fellows Instrument for every gear inspection purpose from the bench-type hand rolling instrument to the complete line of electronic automatic-recording types. Literature and sales-engineering advice on any or all is yours for the asking. Contact the Fellows office nearest you.

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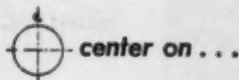
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THE BOSS SHOULD COME BY LAST WEEK WHEN LATHEDOG WUZ KEEPIN' WHITE MICE IN THEM CABINET BASES!



For a complete comparison of Cincinnati lathes with other equipment write for a free copy of "Management Facts About Lathes".

cincinnati

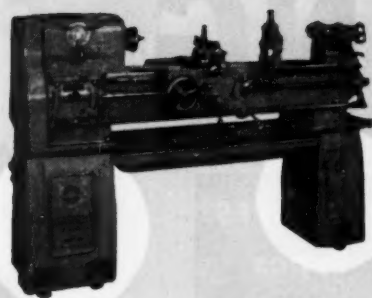
J.R. WILLIAMS

YEAH! THEY
SQUEAKED SO
LOUD **LATHEDOG**
THOUGHT IT WUZ
THE LEAD SCREW
AND KEPT US IN' THE
OIL SHOT
PLUNGER!



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cyclone type
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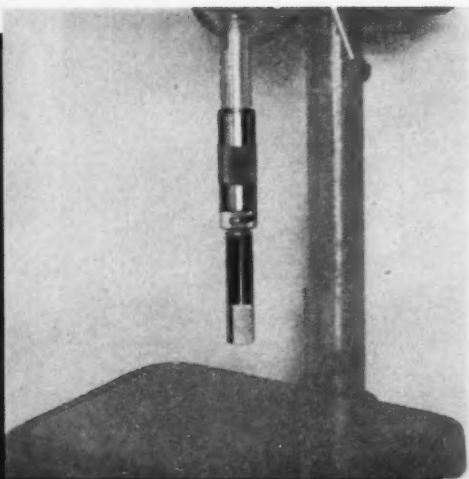


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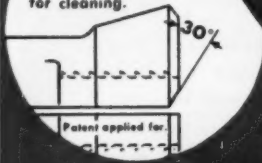
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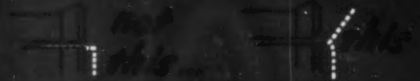


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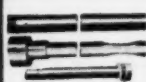
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with

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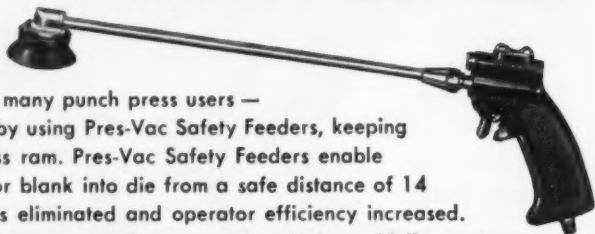


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Boston, Mass. Please send me: ☐ Hydraulic Cylinder Catalog 106
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Frankly, we were surprised when we learned* how many different industrial parts were being made from Johnson Universal Bronze. Thousands of manufacturers and machine shops have discovered that these bronze bars are available in several hundred sizes and inside-outside diameter combinations . . . that they are ready machined . . . that they save time and money. For short runs or individual bearings or parts, they are an ideal material. Johnson Universal Bronze is free cutting with ordinary tools. Its high quality alloy assures long, troublefree performance. Over 400 sizes available from your local Johnson Distributor in machined solid and cored bars, 13 inches long, and in hexagon bars, not machined.

JOHNSON BRONZE COMPANY
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* National Survey
Coast to Coast
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JOHNSON BEARINGS
Sleeve-B Type

SLEEVE BEARING HEADQUARTERS SINCE 1901

WHEN R-B Punches Are Used



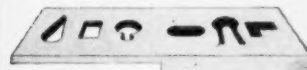
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Special Shaped Holes



Small or Large Holes



Thin or Thick Metal

What are your piercing or forming requirements—standard or unusual shapes—small or large holes—steel or special alloys—thin or thick metals? There is either an R-B punch in standard shapes and sizes or R-B will manufacture special punches, die buttons and retainers to your specifications that will provide more efficient piercing operations.

Many hole-making applications, formerly requiring drilling or some other costly means, can now be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment.

R-B Engineering Service Is Available for Your Tough Piercing Problems.

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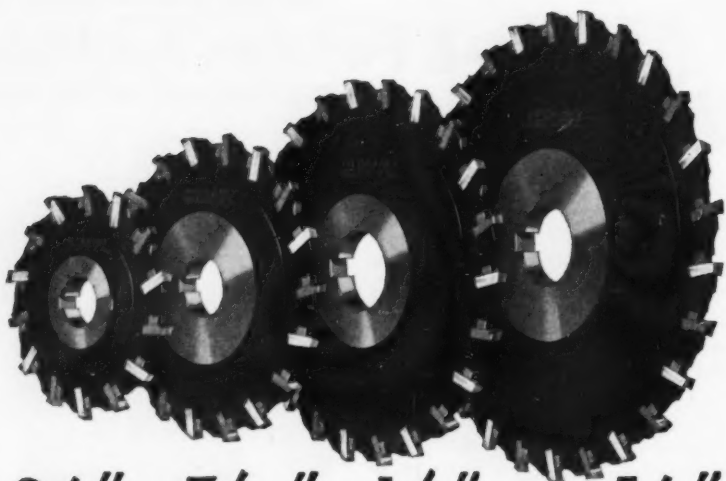
STANDARD CAP SCREWS

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SHEET METAL DIES

MADE OF FERROUS ALLOYS,

ZINC ALLOYS OR PLASTICS



$3/8'' - 7/16'' - 1/2''$ and $5/8''$

THIN **SLOTING CUTTERS**

4'' — 5'' — 6'' — 8'' — 10'' and 12'' in diameter

with Jack-Lock[®] blade locking wedges

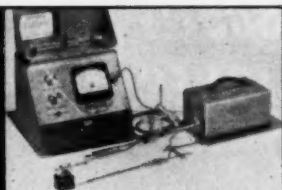
• Developed by McCrosky, these new cutters combine the rigidity of solid slotters with the greater economy — longer life — the easy, positive locking of each blade — and the quick release and accurate blade adjustment of McCrosky's shop-proved Jack-Lock Wedge. Locking pressure of the wedges against the alternate right and left hand milled and ground blades is parallel to the sides of the cutter, avoiding any side stress, warping or misalignment. Easily converted into half side cutters by simply inserting blades all of one hand. New bulletin gives dimensions and full details. *Write for Bulletin 17-M today.*



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**TOOL
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Engineering and Sales Representatives in the Principal Cities



SURFINDICATOR* meets every surface measurement problem

The standard pickup for the SURFINDICATOR is hand operated, permits measurement of virtually all shapes, from $\frac{1}{16}$ " O.D. to $\frac{1}{2}$ " I.D. The new accessories shown above—motor drive and small bore adapter—extend the usefulness of the instrument. Motor drive speeds inspection where large numbers of identical parts are involved. Adapter permits measurements in very small diameters—as small as $\frac{1}{16}$ " I.D.—and other limited areas.

*Trade Mark

See how easy it is to measure **SURFACE ROUGHNESS**

Time-consuming laboratory setups to determine surface roughness are now a thing of the past. With the Brush SURFINDICATOR* you can check surface roughness instantly—anywhere—even when the part is mounted in a machine tool as shown above.

The new ease of measuring surface roughness permits you to control this production variable—which affects machining costs, appear-

ance, friction, wear, product life and many other characteristics. Finish can be specified in blueprints and quickly checked in the shop. The operator simply guides the pickup over the surface and reads roughness in micro-inches directly on the meter. No calculations are required and accuracy of the instrument can be checked at any time against Precision Reference Standards.



TRY IT YOURSELF! Write for a copy of this booklet on Surface Finish Control. Or, ask for a demonstration of the SURFINDICATOR in your plant by a Brush engineering representative. Send coupon now. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Limited, Toronto. Brush Electronics Company, Cleveland 14, Ohio.

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Brush Electronics Company
is an operating unit of
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Brush Electronics Company, Dept. 1-10
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**SCULLY
JONES**

"Precision give you benefits

Quick-Change Chucks speed sequence operations on radial drill at "Caterpillar"

This radial drill at Caterpillar Tractor Co. does sequence operations with multiple-spindle efficiency because Scully-Jones Quick-Change Chucks make tool changes easy and fast! Just lift the locking ring without stopping the machine for quick, safe tool changes. Use them to speed production and reduce operator fatigue on single-spindle sequence drilling, reaming, tapping, and other jobs. Write for Bulletin 3-50.

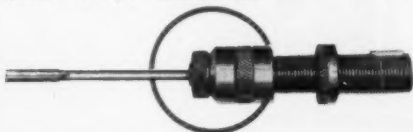


Holding" Tools

which reduce costs on every job!

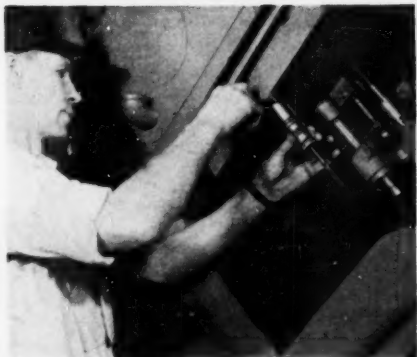
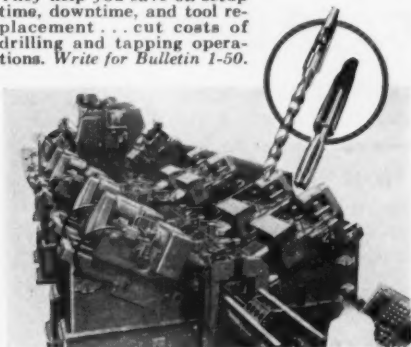
Newest Floating Holder simplifies tool changes, assures free float

Here's how Greenlee Bros. & Co. uses the Scully-Jones new "JT" Lock and Eject Collet Type Floating Holder on multiple-spindle transfer units. With the double-gear spline-drive principle, these floating holders compensate for any misalignment between tools and work... easily maintain close tolerances... reduce downtime and damage to cutting tools... speed and simplify tool changes... reduce maintenance troubles and costs. With true freedom of float, they eliminate "dead spots" and cramping—conditions that may be affecting tool life and quality of work on your drilling, reaming, and tapping jobs! Write for Bulletin 8-50.



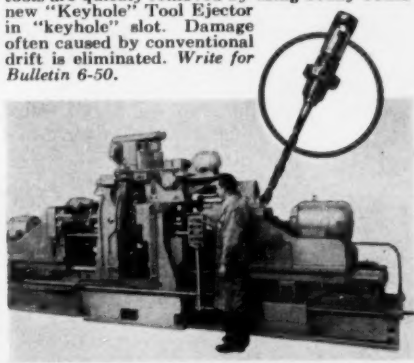
Drill and Tap Chucks cut production costs on Greenlee transfer unit

Greenlee engineers put Scully-Jones Drill and Tap Chucks on this 16-station transfer unit to provide a positive, accurate drive for the cutting tools. Carefully hardened and ground, they resist nicking, give long life under heavy stresses or loads, and run concentric. They help you save on setup time, downtime, and tool replacement... cut costs of drilling and tapping operations. Write for Bulletin 1-50.



Adjustable Adapters speed tool changes and adjustments

Scully-Jones Quick-Lock Adjustable Adapters help this BARNESDRIL 10-station double-end trunnion machine operate at near capacity. The "pilot nose" makes it easy to insert the adapters... minimizing setup and downtime for tool changes. Quick-Lock Nut provides quick, accurate adjustments for tool depth at each spindle or in a tool presetting program. Cutting tools are quickly removed by using Scully-Jones new "Keyhole" Tool Ejector in "keyhole" slot. Damage often caused by conventional drift is eliminated. Write for Bulletin 6-50.



SCULLY-JONES AND COMPANY, 1907 S. ROCKWELL ST., CHICAGO 8, ILL.

SCULLY-JONES

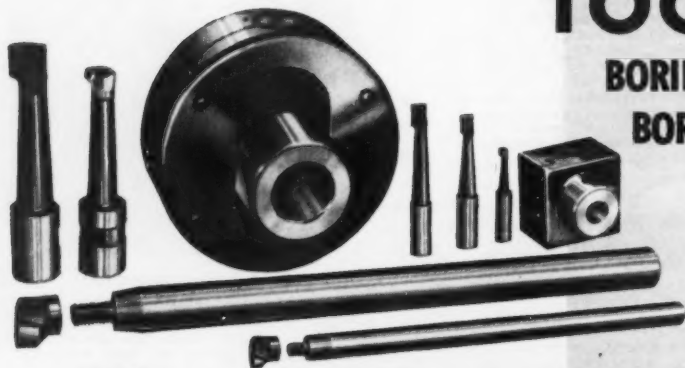
"Precision Holding" for holding precision

Call your Scully-Jones representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for complete information and service.

for more *Accurate* cuts...
greater *Rigidity* in

BORING TOOLS

BORING HEADS
BORING BARS



Use **CRITERION** BORING EQUIPMENT

BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, ⅜ to 1¾ inches diameter. Bore holes from ⅛ to 20 inch diameter.

Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

LARGE OFFSET SAVES TIME AND TOOL CHANGES

These tools will cut your boring costs.

See the complete line of **CRITERION TOOL PRODUCTS** at your local dealers or write for free catalog.

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MACHINE WORKS**

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RELAX! Hold to a tenth and Break Production Records

With the No. 5 Plain Grinding Machine you can conserve time, motion, and effort . . . consistently grind small parts to a tenth or less! Recessed design of base and convenient grouping of all controls permit operators to sit comfortably while maintaining top production. Automatic cycles reduce the operator's task to loading, start-

ing, and unloading. When equipped with **ELECTRALIGN**, alignment control to 0.0001" becomes simple and positive. For the complete story on the No. 5 — one of 18 outstanding Brown & Sharpe Grinding Machines — write for detailed Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



Brown & Sharpe

A new twist in milling cutter design...

removes metal 3 to 10 times faster!
gives finishes of 20 rms and better!



Proof of "Helicarb" efficiency!

A 3" "Helicarb" straight shank end mill on a 50 h.p. mill removed 61½ cubic inches of 2340 nickel alloy steel (Rockwell C28) per minute! Spindle speed 416 r.p.m.; table speed 19" per minute; cut depth 1-5/32".

Ask your authorized industrial distributor for prices and sizes.

The new Sonnet Helicarb Milling Cutters combine the edge hardness of one-piece carbide tips with the proven principle of a true helix flute design. Result? A rugged, heavy duty cutter unmatched for stock removal and efficiency!

The constant included cutting angle of the "Helicarb" cutter distributes the cutting load uniformly over the full length of the cutting edge. Under proper conditions, this unique shearing cutting action reduces impact and gives 3 to 10 times greater production than possible with helical flute high speed steel, or straight tooth, carbide-tipped cutters. Uniform chip load and proper chip flow result in longer cutter and carbide life, less chatter, minimum chip recutting and smoother finishes—20 rms and better on actual production jobs!



Slab Mills



Shell-End Mills



End Mills



HELICAL CARBIDE MILLING CUTTERS

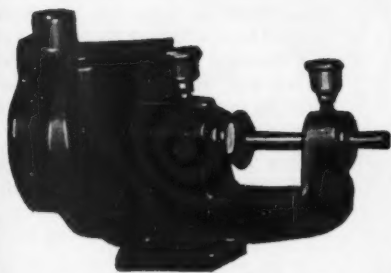
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**Precision-designed and engineered
to do ONE THING and DO IT BEST:**
**KEEP TOOLS COOL AND
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For the machine tool and other industries, FULFLO
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MODEL PRS4, Right rotation

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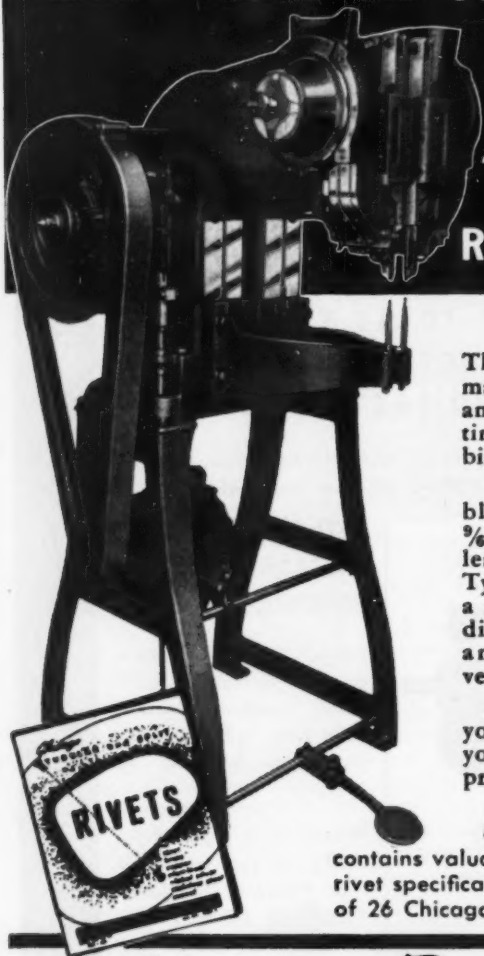


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CUT COSTS...FASTEN "ON THE DOUBLE"

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Chicago "214" DOUBLE RIVET SETTER



The "214" automatically feeds, inserts and clinches two rivets at a time...with speed that may mean a big saving in your fastening costs.

14' throat makes large assemblies easy to handle. For up to $\frac{9}{64}$ " diameter steel tubular rivets—lengths to $\frac{7}{8}$ ". Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility.

Ask us how the "214" can help you cut costs. Send a sample of your problem assembly (or blueprint) for a Free fastening analysis.

FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9610 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

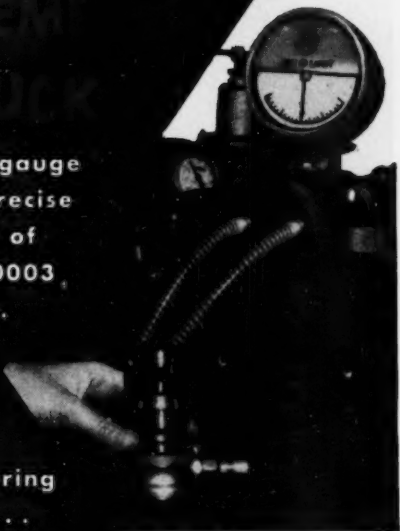
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is checked by air gauge
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produces . . .



Quality

Supreme Chucks

BRAND

Interchangeable with other makes . . . entire body
hardened inside and out for greater durability . . . jaws
nickel chrome moly alloy steel . . . one piece geared
nut construction. The economical chuck to use.



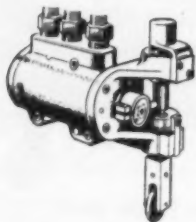
SUPREME PRODUCTS, INC., 2222 S. Calumet, Chicago 16, Ill.

the chuck that lives up to its name ... **Supreme**

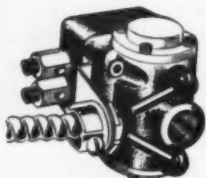


UNBRAKO SOCKET CAP SCREWS have knurled heads for sure grip and fast assembly; accurate hex sockets for positive, nonslip internal wrenching; fully formed

threads, Class 3 fit. They are made of heat treated alloy steel, with controlled fillet and continuous grain flow; are available in standard sizes from #4 to 1".



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On textile machines, automotive equipment, electrical and electronic devices, and production machinery.

Do you really need a special UNBRAKO ?

Before you specify a special socket screw, check UNBRAKO Standards. A standard UNBRAKO will do the same job much cheaper in most cases. You'll get better service and faster deliveries, because UNBRAKO socket screw products are stocked by your industrial distributor. Write for UNBRAKO Standards. STANDARD PRESSED STEEL Co., Jenkintown 52, Pa.



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On precision instruments, dies, jigs and fixtures, and many other applications too numerous to mention.



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MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

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You get design assistance, too!

ONE of our experienced stainless men will be glad to work with you on stainless steel selection problems so that you can use the most effective and economical grades and sizes. And we follow through from design to delivery to make sure that you get exactly the steel specified for the job. With complete stocks of dependable USS Stainless Steels, fast delivery service, and competent, thorough technical assistance, we offer a real cost-cutting combination.

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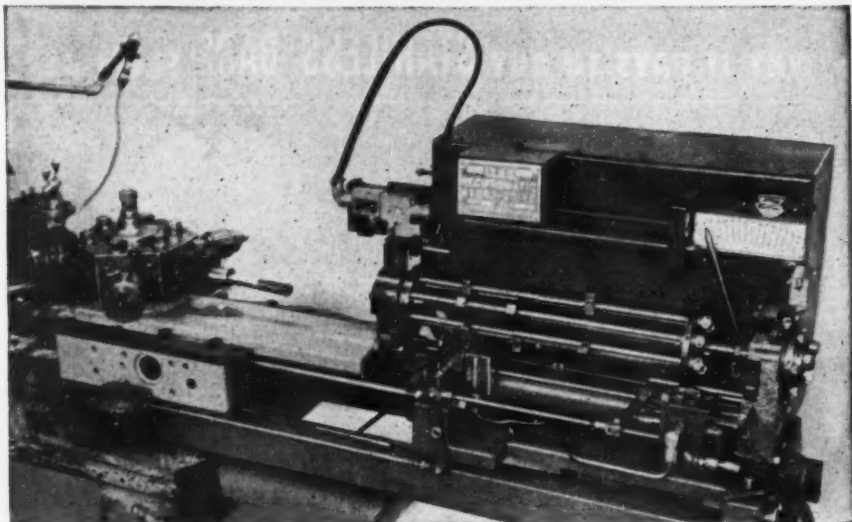
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PRODUCTION INCREASED FROM 18% TO 162% ON TURRET LATHE EQUIPPED WITH LYNN HYDRAULIC-DRIVE

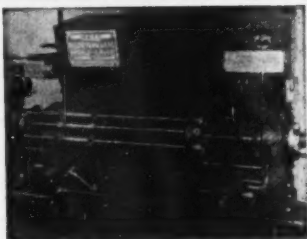
Actual production records* on 10 different set-ups, before and after installation of a Lynn Hydraulic-Drive on a Turret Lathe, show production increases ranging from 18% to 162%.

The Lynn Hydraulic-Drive can be installed on ANY ram type turret lathe. Lincoln engineers make the installation, instruct operators and assist methods engineers.

20% Production Increase Guaranteed

The Lynn Hydraulic-Drive can be paid for out of increased production with profit left over for you!

*Details on request.



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HYDRAULIC-DRIVES.**

**Other LYNN Products include:
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—Slide Tools.**



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VITRIFIED WHEELS

For more than 25 years, Blanchard has directed its efforts toward developing the best grinding wheels for Blanchard Surface Grinders. It began by pioneering with silicate bonded wheels, and then resin bonded wheels. Now, from a new, ultra modern Blanchard wheel shop come *vitrified wheels* ... scientifically batched, pressed and fired ... with positive control of time and temperature.

Today, Blanchard offers complete wheel service ... silicate, resin and vitrified!

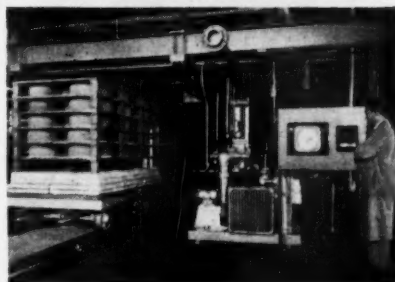
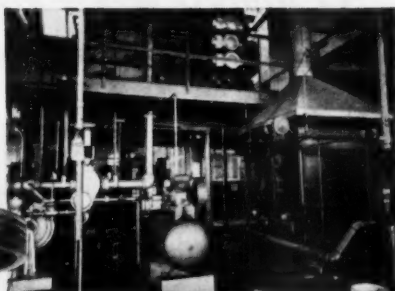
Use Blanchard wheels on your Blanchard Surface Grinder. They do a better job in less time, with less trouble and cost ... whether your work is tough as copper or fragile as glass ... whether it requires heavy roughing cuts or clean-up cuts with flatness to .000005" and finish of 1 micro-inch.

for Better Blanchard Grinding

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Machines that give you***

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You get more when you buy an Index Mill—more quality, superior features. You are not just buying a machine . . . You are investing in equipment that will deliver better results at lower cost. The ideal machines for all your

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Outstanding in this great line is this versatile MODEL 55 VERTICAL MILL, designed for those extra capacity jobs often found in tool and die shops; provides increased speed and feed range. Capacity $\frac{1}{8}$ " to $1\frac{1}{2}$ " end mills in steel, a table working surface of $32" \times 9"$ or $38" \times 9"$; overall $40" \times 9"$ or $46" \times 9"$.

MODEL 40 VERTICAL MILL

For speedy, economical milling. Spindle gives 9 speeds, 125 RPM to 2250 RPM. Easy to operate. Rugged, for every day operation; also used for boring and locating. Capacity $\frac{1}{8}$ " to $1"$ end mills in tool steel. Table working surface $8" \times 26"$, $8" \times 34"$ overall.

MODEL 60 HORIZONTAL MILL

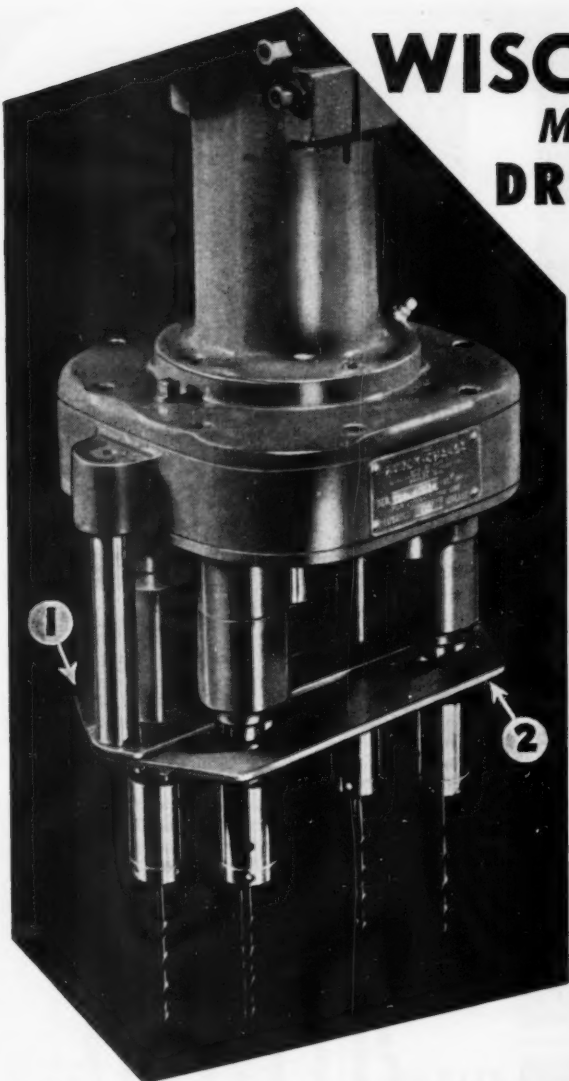
Simple, efficient, compact, with all operating parts enclosed, yet readily accessible. Unusually low-priced. Designed for the average tool room, yet highly suitable for production shops through its rigidity and low maintenance cost. Standard table $40" \times 9"$, larger table optional.

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Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

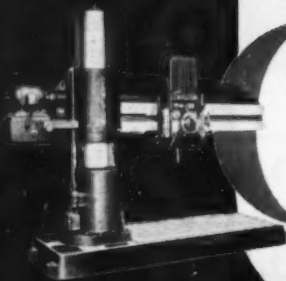
2. Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

WISCONSIN DRILL HEAD CO.

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... here's another good reason why:
**CARLTON'S
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DRIVE**

BRINGS THE HEAD *and* SPINDLE down to the work ... not just the spindle.

Spindle accuracy and rigidity are assured *because the spindle is always close to the radial arm support*. This design eliminates spindle twist, which is one cause of vibration, thus reducing manufacturing costs by increasing tool life.

The main drive gear is placed in the *lowest part of the head*. It drives on the *largest diameter* of the spindle, *closest to the cutting tool* ... a principle well established by its wide use in planers, lathes and milling machines. This permits the greatest amount of torque transmission.

Carlton's low hung drive ... plus all-ball-bearing construction, centralized pushbutton control, modern lubrication, 3-unit power clamping of arm, head and column, and Carlton's many other advantages ... means increased 'hole' production for you.

Write today for bulletins describing the Carlton Radial Drills you need. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Carlton
radial drills

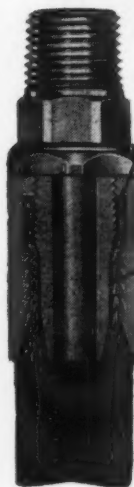


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permanent-type couplings to hose—
assuring tight seal.

BURST CHAMBER TESTS →
hose assemblies to destruction, using
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Couplings are designed to withstand
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Special design of coupling expands and locks hose into this chamber—assuring tight, non-slip fitting.

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Tight seal and heavy wall eliminates loss of compression under extreme usage.

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with
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Norgren
hose assemblies

Norgren Hose Assemblies available with permanent or re-usable couplings.

High, medium and low pressure assemblies for air and hydraulic service.

Sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ " I.D. in permanent types; $\frac{1}{4}$ " to 1" in re-usable types.

Pressures up to 4500 psi. ($\frac{1}{4}$ " 2-wire braid.)

1 and 2-wire braid hose; also 2-rayon braid hose, $3/16$ " to $1\frac{1}{2}$ "

Couplings: Combinations of male and male, male and union male, union male and union male, male and union female, union female and union female.

Also a complete line of couplings, stems and fittings.

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12" sawing
es, and
apers.

Brief Facts

Net Capacity, 1"
indle Hole, 1 1/8"
g over bed, 11 1/2"
ter Distance, 24"
Width, 6 15 16"
Bearing Spindle
Spindle Speeds,
5 to 1500 rpm
ble V-belt Drive
oads—48 selec-
ns, RH or LH—
4 to 224 per inch

Write for the
Logan Lathe Catalog

Logan

ENGINEERING CO.

Lawrence and Lamon Avenues, Chicago 30, Illinois

LOOK TO

FOR BETTER LATHES AND SHAPERS

October, 1954

117

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Electrical
Equipment
included)



Eliminate cumbersome expensive threading and fabrication of pipe assemblies with "ELLS". It is now possible to bend 1" pipe and have only 1" of tangent on one end. The ell shown is 1" pipe, bent to a 2 1/2" radius. Production machines with automatic duplicate bending relays are available up to and including 6" extra heavy pipe. The machine shown is the model "A-6" which has a bending capacity of 2" extra heavy pipe. Smaller and larger machines are available. The same machine can be used for bending tubes, structural shapes, reinforcing bars, etc., by merely changing the die.

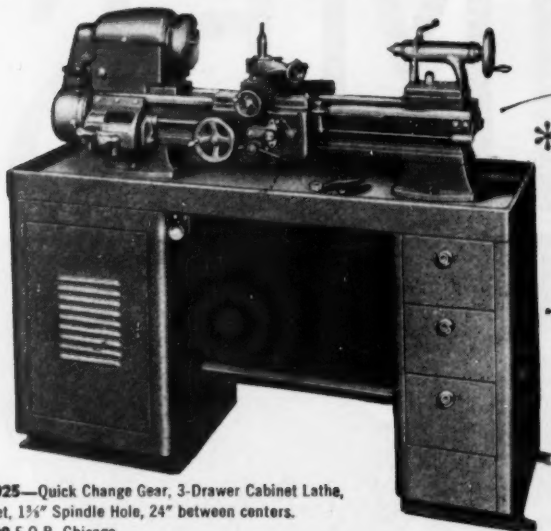
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The Answer

To your metal turning cost problem
may well be this 11" Logan Lathe *



No. 1925—Quick Change Gear, 3-Drawer Cabinet Lathe,
1" Collet, $1\frac{3}{8}$ " Spindle Hole, 24" between centers.
\$875.00 F.O.B. Chicago.

* One of the
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complete Logan
Line of 9", 10", 11"
and 12" swing
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8" Shapers.

The cost of precision results drops sharply when you turn work on this 11" swing Logan 1925. With 1" collet capacity, $1\frac{3}{8}$ " bore, and 24" centers it takes pressure off costly-to-run, big lathes . . . with no difference in precision results.

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Brief Facts

- Collet Capacity, 1"
- Spindle Hole, $1\frac{3}{8}$ "
- Swing over bed, $11\frac{1}{2}$ "
- Center Distance, 24"
- Bed Width, 6 15/16"
- Ball Bearing Spindle
- 16 Spindle Speeds,
45 to 1500 rpm
- Double V-belt Drive
- Threads—48 selec-
tions, RH or LH—
4 to 224 per inch

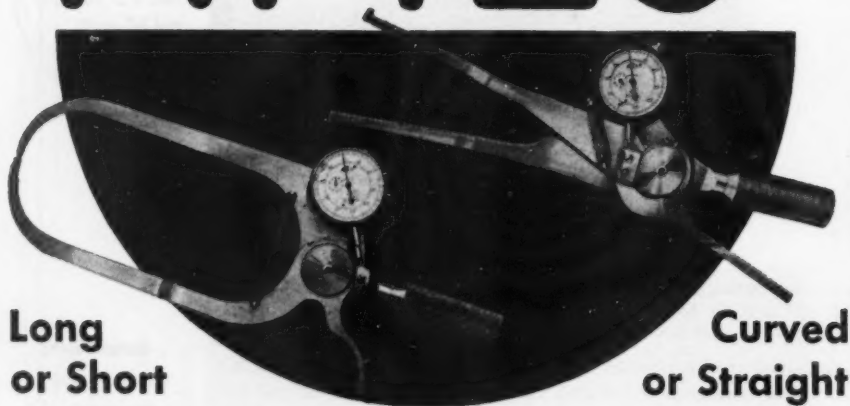
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LOOK TO

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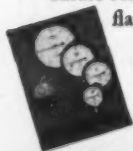
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Figure 1. Lincoln INERTARC... New development in quality welding with inert gases. Current range... 10 to 350 amps. Can be changed over for conventional AC welding in 2 minutes.

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Speeds Welding. High responsiveness to changing arc conditions provides steady arc with maximum ease... maximum speed of welding without sacrifice of quality on aluminum, non-ferrous and on stainless steel fabrications when AC is specified.

New Safety for Operator. Open circuit voltage on the holder remains at zero until the "start" button is depressed. With INERTARC, there is no continuous high frequency or high voltage for arc starting or welding.

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DUAL PURPOSE WELDER — INERTARC is easily changed over to conventional AC welding with coated electrodes. Changeover takes 2 minutes.

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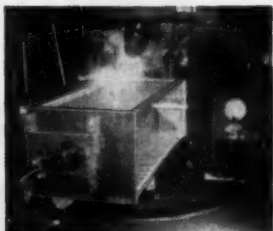


Figure 2. Speeds Fabrication of utility cabinets from 2-S and 3-S aluminum to cut production costs.

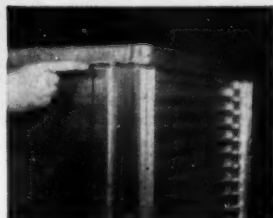


Figure 3. Improves Quality by producing solid, smooth welds with minimum discoloration to parent metal. Photo shows bead as welded.

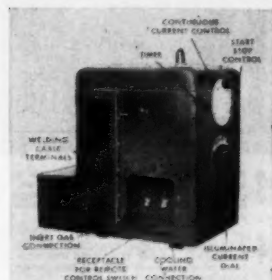


Figure 4. Simple to install. Connections for welding cable terminals, cooling water and inert gases are housed in recess at side of machine. Illuminated current dial indicates when welder is turned on.

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Product Costs

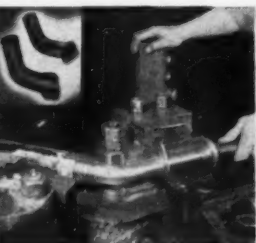


- 2 HOLLOW TRACTOR BOOMS**—Cold bending 18 ga. welded steel tapered tubes without distortion on Size 4 Pines unit eliminates expensive blanking and forming dies, saves tons of material for farm equipment manufacturer.



- 3 EXTRUDED WINDOW FRAMES**—Part of production line setup in large aluminum fabricating plant, this small Pines Semi-Automatic saves space, accurately bends automobile window frame moldings.

- 4 REFRIGERATION AIR CONDITIONING ELLS**—Special Pines Automatic Cut-Off Benders now produce copper ell's and return bends at speeds up to 1500 per hour, reduce scrap losses to 1%.



- 1 AIRCRAFT TUBING**—Smooth, extra sharp bends now produced in ultra-thin stainless steel tubing, saves space and \$14,000 per plane for aircraft manufacturer. Shown above, Pines Size 4 Unit forming virtually-free 2" c/r radius bend in 4" x .028" 5. S. tubing.

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Specialists in Tube Fabricating Machinery 695 WALNUT • AURORA, ILLINOIS

- 5 ENGINE MANIFOLD TUBES**—Short 1 1/2" O. D. steel tube now bent to 1 1/2" c/r radius with flange attached saves space, insures accuracy, cuts costs.

- 6 BOILER TUBE AND REFRIGERATION COILS**—Typical setup bending continuous serpentine coils from 1/2" steel tubing. Reduces welding, fabricating costs. Other installations range from 1/4" copper up to 3" steel tube.

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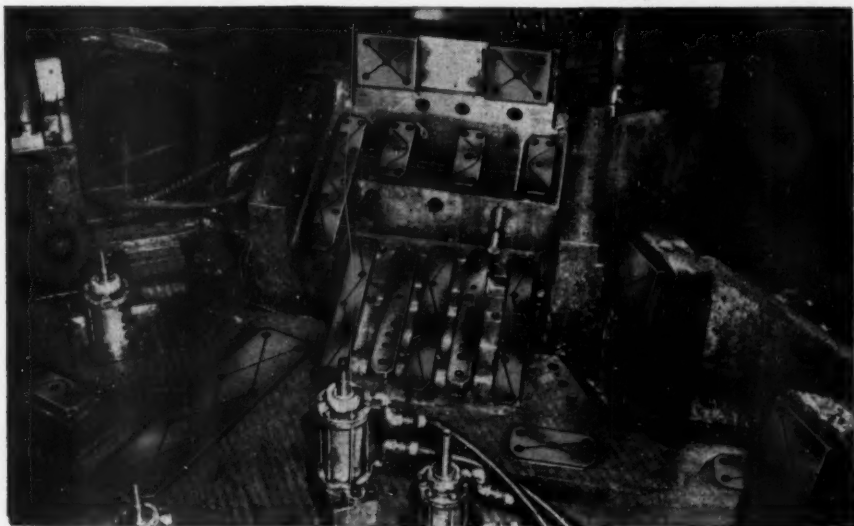


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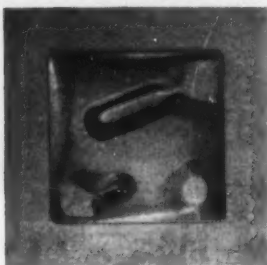
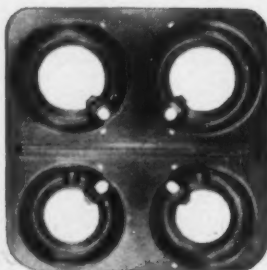
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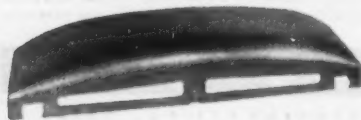
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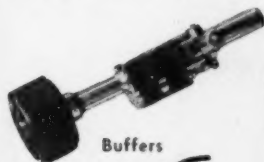
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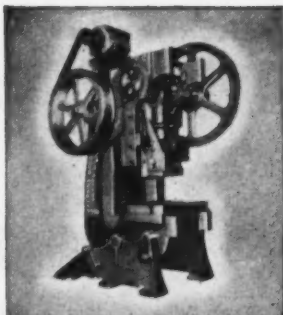


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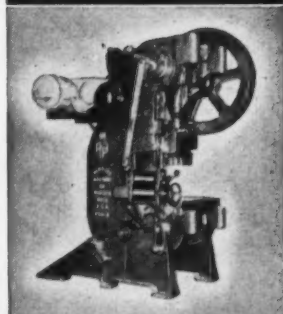
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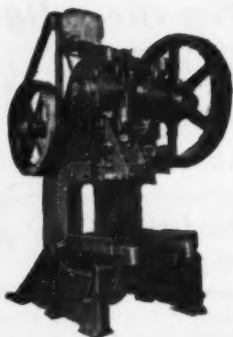
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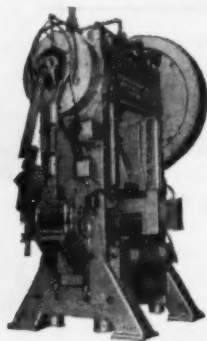


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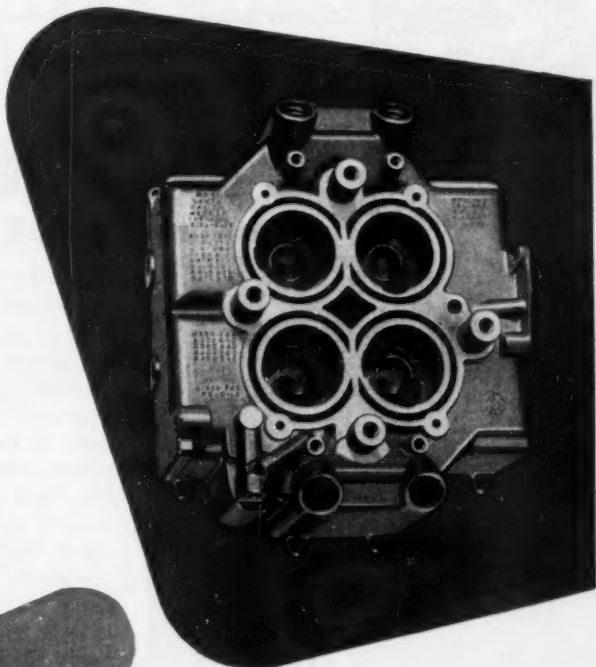
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FACE	4	SURFACES
TAP	2	HOLES
REAM	2	HOLES
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TAP	2	HOLES
DRILL	2	HOLES



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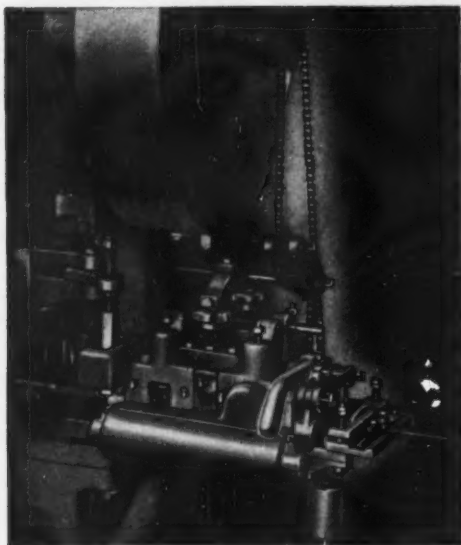
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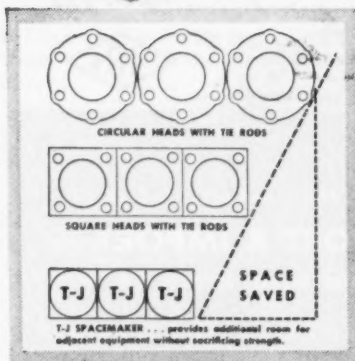
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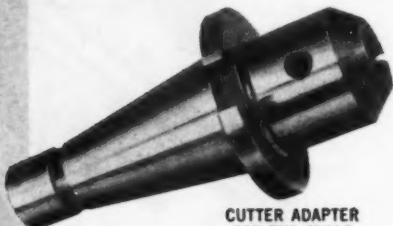
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Featured IN THIS ISSUE

Cutting Forces	157
Time Study—Levelling, Set-Up, Allowances	170
Special Report No. 42, Presses	269
Studebaker Cuts Costs by Drawing and Wrapping Fenders	269

Cutting Forces Most Important Aspect of Machining, by Horace Frommelt, Consulting Engineer. Mr. Frommelt states that a successful job is assured only when cutting forces are clearly conceived, and understood in the cutting tool itself. He covers the subject with authority and clarity. Page157

Tool Trays for Engine Lathes, by C. T. Mischief. Finding a suitable place for small tools on a lathe is a constant headache for many operators. Here are some well-thought ideas that should provide the answer to this problem. Page164

Levelling, Set-Up, Allowances, by Harold R. Nissley. This is part three of a series of time study articles written by Mr. Nissley, well-known and recognized authority on time study and industrial engineering. The writer answers questions from our technical and operating readers in this article. Page170

Air Clamping Speeds Jet Engine Parts Production. The Jet Air Engineering Corp. is engaged in making "hot parts" for combustion sections of jet engines. This article deals with the use of compressed air as a means to increase production and lower operating costs. Page185

Turret Lathe Used for Toolroom Work, by John Elliott, process engineer, Tracer Control Co. Dies Industries of Hazel Park was building an injection mold for plastic ash trays and found themselves unable to use the tracer controlled lathe slated for turning contours of component cores and cavities because of a breakdown. However, they solved their problem in a neighboring production shop on a Bardons and Oliver No. 5 turret lathe. Page190

Geneva Drive Feeds For Punch Presses, by Joseph Midulla, Geneva Machine and Tool Corp. The problem of feeding seven tons of steel material through a punch press at 1¼" stroke was solved by a feeding mechanism supplied by the Geneva Company. The feeding mechanism was designed for the making of steel straps for tomato cartons on a punch press. Page 196

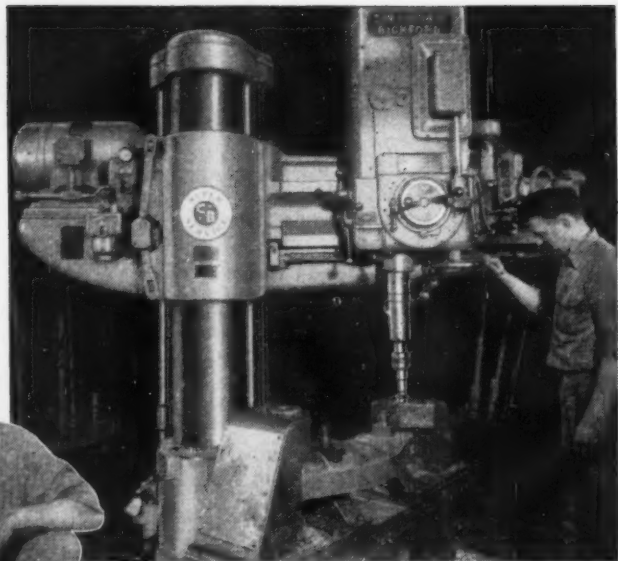
Dust and Debris . . . Two Gangsters in Industry, by Fuller Ross. Too many man-hours are spent by industry pushing push-brooms about the plant. Mechanical floor sweepers save manpower and money. Page223

How Ryan Forms Titanium, by Frank Charity, Ryan Aeronautical Co. A research program conducted by this company has shown that commercially-pure titanium can be either cold or hot formed with punch presses, bending rolls, brake presses, hydraulic presses, and hammer facilities. Page228

How to Measure Up to Your Foreman, by George Allison, management consultant. In some cases the foreman is less-informed than the workers around him. He has no way of knowing what management is thinking unless he is told. Here are some avenues management should follow to keep in step with its foremen. Page255

Drawing and Wrapping Fenders Cuts Costs, by Wm. R. Myers, Studebaker Corp. Cost reductions of over 35% have been realized by Studebaker in front fender finishing. Mr. Myers covers fully the drawing and wrapping method of fender production and the advantages gained over the previous costly operations of drawing, folding and welding. Page269

Main lever of 24"
Industrial Shaper.
Gould & Eberhardt,
Inc., Irvington 11,
New Jersey.



Photographs courtesy of Gould & Eberhardt, Inc., Irvington 11, New Jersey.



"improved quality"

This exacting job at Gould & Eberhardt, Inc. calls for drilling, boring, reaming and facing one 2 1/4" hole and one 1 1/4" hole. Holes must be parallel with each other and square with the ways within .0015" per foot. Diameters are held to $\pm .0003$ ". This Cincinnati Bickford Super Service Radial Drill brought improved quality in production.

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Cincinnati 9, Ohio, U.S.A.

AS THE

Editor

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Must Be Under 40

We are still amazed at many of the help wanted ads which grandly specify that an applicant must be under 40. The implication being that at 40 a man automatically changes from pliant rubber to hard rubber and is of little value. This is a vicious, deadly lie!

"What we need is young ideas and ambition," the employers say. Inasmuch as they are over 40 themselves the statement serves as an admission that they have already petered out mentally and assume that others over 40 are equally as barren and creatively sterile. They dare not admit that others sparkle more after 40 than before; no one likes competition, especially when it threatens a comfortable rut.

"The youngsters have more ideas, they like to take a gamble," they add. So? Really? Do they mean like the following "youngsters" whose lamps blazed brightest after 40: Jefferson, Franklin, Edison, Kettering, Sandburg, Alexander Graham Bell, Twain, Goethe, Beethoven, etc? Studies show the high point in creating is reached at 50. Psychologist George Lawton points out that the mind doesn't stop growing until 60 and then ebbs so imperceptibly that a man of 80 can be as mentally spry as a kid of 30.

As for youngsters taking a gamble—neither production nor business is a

gamble; a calculated risk, yes, and so we hope no one minds if we take the risk with a man who knows what it's all about.

We have met hundreds of production executives and the best were well over 40, mature and seasoned. We have yet to meet more than an occasional youngster who filled big shoes: golden promise, ability and star dust, yes, but the calm maturity, not yet. Many men under 40 glitter like frosty winter stars. While we are mindful of them we submit that thousands of stars are over 40 for every youthful twinkler. Remember, when hiring men you're really hiring creative ideas. You're groping for steady lights that don't flicker but burn briskly on knowledge, experience and ideas.

It may be interesting to know how the vicious 40-year line was drawn and by whom. An unknown physician and professor said, "If you haven't cut your name on the door of fame by the time you reach 40, you might as well put up your jackknife." The same professor was of no national fame until he wrote "The Autocrat of the Breakfast Table," when he was nearing 50. His name? Oliver Wendell Holmes, who reached the height of his creative life at the age of 75 when he wrote his biography of Ralph Waldo Emerson!

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Letters TO THE EDITOR

Time Study

Reference is made to the article concerning Time Study, written by Mr. Harold R. Nissley and appearing in the August, 1954, issue of MACHINE and TOOL BLUE BOOK. We are interested in the work being done by Mr. Nissley and wonder if he may have possibly covered this subject in text books or other publications. We would appreciate any information you have in this connection.

We should also like to have a copy of Mr. Nissley's previous article as it appeared in the March 1954 issue. If possible we would appreciate prepublication copies of the articles now appearing and to appear in the future.

V. Frederiksen, Chief Ind. Eng.
Dodge Div., Chrysler Corp.

Mr. Nissley's articles have appeared in the BLUE BOOK and other business magazines for a number of years. He has not prepared a text book on time study. It is hoped that the current series of articles may be compiled into a booklet and made available to the industry. Tear sheets of all articles have been sent. Mechanical problems prevent sending prepublication copies; future published articles will be sent to reader Frederiksen.

I am very much interested in the article "How to Make Your Time Study Standards More Accurate . . . More Salable" which appeared in the March issue of MACHINE and TOOL BLUE BOOK.

Would you please send tear sheets of this article to me at your earliest convenience, or let me know where I can obtain them.

Allen C. Siegel, Mgr. Mfg.
Engineering, RTV Dept.
General Electric Co.

We would appreciate receiving tear sheets, if available, of your articles on time study in the August issues.

Howard E. Campbell, Prod. Eng.
Dept.
Solar Aircraft Co.

Tear sheets sent.

Information Please

Can you favor me with the address of Muffle Furnace manufacturers, preferably those that operate as Bunsen burners.

These furnaces are to be used in heat treating of various steels but we do not anticipate using these on high speed steels.

J. M. Clark, Pres.
Jas. Clark

List of manufacturers have been sent.

Perhaps you could assist me in obtaining more information relative to the feature article "Selecting and Using Wool Felt for Vibration Isolation," by Leon D. Gruberg, in your August, 1954, issue.

Could you possibly suggest the name of business firms that either manufacture or retail this wool felt.

M. Loring
Bruin Metal Products

We would appreciate your sending us the names of two or three manufacturers of Sludge Pumps for Cleaning Coolant Systems.

*George B. Hays, Pres.
Hays Supply Co.*

Special Report

Appearing in the August, 1954, issue of MACHINE and TOOL BLUE BOOK is the articles "Built-in Automation in Dieing Machines" by W. S. Renier, report No. 40 . . . Presses . . . part 2, which is of much interest to the writer. We are writing to ask if it is possible to receive two or three copies of this report.

*J. B. Burton, Chief Design Eng.
Press Dept.
The Waterbury Farrel Foundry &
Machine Co.*

In your August issue you advertised a sine bar. Would you please have the advertisers of this mail us a circular on it. Our August BLUE BOOK has been misplaced, therefore we do not have the advertiser's name.

*William Cupit, Tool Crib Supr.
Raytheon Mfg. Co.
Equipment Mfg. Div.*

Please recommend a number of reference books on polishing methods, tools, and material for aluminum and bronze.

*Jim Ramsey
Ramsey-Kantz, Inc.*

Would you send us two copies of the January 1954, Jet Power edition of the MACHINE and TOOL BLUE BOOK? ..

*Henry Rottersman,
Chief Engineer
Elo Development Co.*

I would like to receive a copy of Jet Power Issue, Jan., 1954, of MACHINE and TOOL BLUE BOOK, at your earliest convenience.

*W. W. Chao
Ann Arbor, Mich.*

Information and/or reprints has been sent.

Vernon OBI

We have an old type 2 Vernon O.B.I. punch press in our shop and have been endeavoring . . . so far without success

. . . to locate a representative handling this line of replacement parts.

If you know of any person or firm who would be able to supply us with replacement parts for this press, we would sincerely appreciate receiving this information.

*W. D. DeBernardi, Mgr.
Parker Electrical Co.*

Production Tapping

We have read with much interest your feature article "Trends and New Developments in Production Tapping" which appeared in the July issue of the MACHINE and TOOL BLUE BOOK.

We would appreciate your forwarding four reprints of this reprint at your earliest convenience.

*R. G. Belprez
The Wickman Mfg. Co.*

Please send me a reprint of the article "Trends and New Developments . . ."

*H. V. Townsley, Supr. Small
Machines Div.
National Automatic Tool Co., Inc.*

The article "Trends and New Developments . . ." is of interest to us and we would appreciate receiving six copies for distribution to our machine shops.

*C. F. Benner, Project Eng. Supv.
Continental Can Co.*

I have read your feature article of "Trends and New Developments . . ." and found it of great interest and value. If any more reprints are available, I would like to have one for my files.

*Walter Janulewicz, Foreman,
Shop Service
Stryker Machine Products Co.*

Please send us 50 copies of "Trends and New Developments in Production Tapping," written by Harry Conn, Scully-Jones and Company, Chicago, reprinted from MACHINE and TOOL BLUE BOOK.

*W. A. Coulter, Adv. Mgr.
Harris Pump and Supply Co.*

Reprints have been sent. A few reprints are still available. You send note, we send reprint.

LAST MINUTE WASHINGTON NEWS

★★★

by Arnold Kruckman
Washington Correspondent



The ordinary student of finance has difficulty in understanding Federal Government figures. The difficulties of a congressman with average financial training, therefore, may be understood. He asked the Bureau of the Budget, the Department of Defense, other major departments, and agencies directly allied with Government finance, such as the Treasury, for over-all figures in order that he might make an intelligent report to his constituents. When the information came in he found the data so conflicting that he was utterly bewildered. Like almost all other members of the House, that congressman has not yet been able to understand clearly just how much it costs to run this Government, what is expected of the people in the way of support, and what we, as a nation, actually owe.

Obviously, much of it is due to the enormous growth of these United States. They maintain a clock in the corridor of the Department of Commerce building which never stops, and which each minute shows how many persons are added to our population. The authentic census figures certify that the population exceeds 164 million persons and is approaching 165 million; and that we are adding population sufficient to start a new state of California every three years. This colossal expansion admittedly has exceeded the ability of the Government organization to keep intelligently abreast of the figures. In addition, we have not yet adjusted the bookkeeping system so that accounting in one agency, or one department, means the same thing that it does in another. In other words, a greater part of the 200 plus Government units have their singular and particular manner of keeping accounts. Naturally this leads to confusion and bewilderment that makes an almost impossible job for the men and women who try to conduct the business of the nation in the Congress. There is a commission, working with the Bureau of the Budget, and other agencies, which is trying to install a universal accounting system in the Federal Government. But to bring

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- 6 Honed hole to provide proper surface condition for precision fit and best lubrication.
- 7 Bearing surface extends full length of body . . . increases bearing area up to 25% . . . assures better alignment.
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- 9 Alemite fitting for easy, positive lubrication.
- 10 Specially designed retainers to securely hold the bushing in exact position . . . eliminates unknown holding strength of press fit.
- 11 Bushings have pre-fitted inside diameters and are wring-fit in the die shoe. This eliminates the possibility of distortion and necessity of hand honing after assembly. Too, positive alignment is obtained by seating the ground bushing shoulder on the finished die shoe surface.
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*PAT. PENDING

this about is by no means easy. A businessman will appreciate dimly the difficulties.

With this picture as a background it may be possible to understand why the figures of the business transactions of the latest session of Congress cannot be taken as absolute gospel. In essence they are approximate—but a very honest effort to reach a genuine presentation of the state of our affairs. Nor have we, as yet, all the figures to cover the appropriations and allied business transactions of the Congress that has just adjourned. The new tax system, which we know as the revision, with its thousands of legally required changes, will take months to clarify, understand, and make effective in the Treasury and the Bureau of Internal Revenue. In the meantime the people in Internal Revenue, and in other parts of the Treasury, have been working industriously to provide a temporary expedient to function in the place of some of the permanent changes that are indicated.

It is doubtful whether any Government official, or student of Government finance, can tell you exactly what has been provided for the year ahead. We know that the Treasury-Post Office were given an appropriation of \$3,332,732,700; State-Justice-Commerce, \$1,201,710,500; Army civil functions, \$457,071,300; independent offices, \$5,651,770,063; Interior, \$405,936,149; Agriculture, \$723,683,150; Defense \$28,800,125,486; Labor-Health, Education and Welfare, \$1,975,198,261; Legislative-Judiciary, \$98,197,494; Supplemental, \$1,659,101,929; Mutual Security Program, \$2,781,499,816; District of Columbia \$21,890,000; public debt interest, etc., \$7,179,176,562.

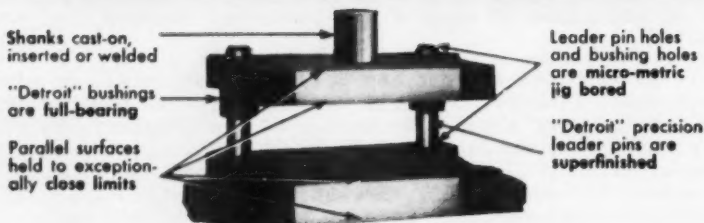
This makes an apparent total in appropriation just enacted of \$54,288,093,410. But as indicated earlier, it is scarcely an accurate presentation since there are numerous odds and ends of appropriations which have not yet appeared after their passage through the various channels, including the White House. To grasp, even faintly, these Government business figures, it is necessary to realize that many departments and agencies carry over from past years parts of appropriations that are unspent. This year the Congress tried to go into this problem by reducing the unexpended fund balance about \$170,000,000. But admittedly this is only a minor fragment of what is known as the unobligated balance in the various carry-over funds.

On the other hand, there actually has been an increase in the spending program. The authority of the Commodity Credit Corp., to borrow from the Treasury to finance farm price support operations has been hiked from the former level of \$6,750,000,000 to \$10,000,000,000. The two-year Federal aid highway program was raised from \$875,000,000 to \$966,000,000, including grants to states. A sum of \$126,000,000 was provided to build an Air Force academy. New rivers and harbors and flood control projects for future construction were authorized (but not appropriated) at an estimated cost of \$1,072,000,000. The new FHA Housing Act authorizes the construction of 35,000 public housing

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units. The St. Lawrence Seaway Corp., is authorized to borrow \$105,000,000 from the Treasury to begin the preliminary steps to construct the St. Lawrence Seaway. There is a new defense public works program which will cost \$1,299,000,000. The new Navy shipbuilding program is to cost \$450,000,000. And there are several programs, intended as a shot in the arm for lagging business, which cost about \$100,000,000 each.

It is no secret that the White House plans to release a considerable number of contracts for defense work in early October. This has two immediate purposes. It is intended to quicken lagging business, particularly those parts of the business economy which interest the machine tool people, and it is expected to have a sharp and advantageous effect in behalf of the Administration upon the November elections.

An interesting statement was recently issued by Paul O. Peters, a research technician in Washington, who is well informed on the finances of the nation. If you have an interest in this kind of information address him at 606 National Union Building, 918 F Street, N.W., Washington, D.C. One of his late statements shows that in the month of July, 1954, Federal spending exceeded revenues by \$2,417,000,000. In one of his reports he points out that Congress has actually appropriated money which the Treasury does not have to meet whatever drafts are made upon the appropriation. The net result is that the particular appropriation simply is waiting until the necessary arrangements are made to honor the checks. Peters also has dug up the figures for the admitted deliveries of military items to foreign governments from October, 1949, through June, 30, 1954: artillery ammunition-45 million rounds; small arms and machine gun ammunitions-1,500,000,000 rounds; rifles, pistols, machine guns-2,000,000 pieces; motor transit vehicles-188,497 units, tanks and combat vehicles-34,733 units; artillery pieces (including atomic cannons)-34,802; naval vessels-784 ships; electronic and signalling equipment, including radar-127,403 units. He is trying to find out which countries received the artillery pieces and the 784 naval vessels.

The President has announced that he intends to make a drive to reduce the tariff on imports. He not only wants a three-year extension of a revised Reciprocal Trade Agreement Act, with full authority to cut the tariffs by not less than 5% and as much more as may be necessary, but he has other ideas. Incidentally, many proposals of a similar nature that are unpopular with the country, and therefore with the Congress, are expected to be floated in a similar manner before Congress returns next year.

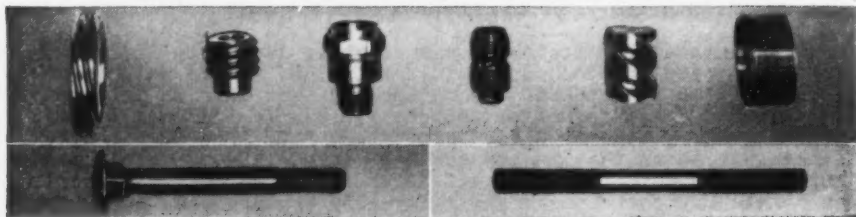
The Secretary of Commerce has suggested that we should have definite tariff reductions, modification of import barriers, and more adequate protection of private oversea investment, in order to encourage the flow of U.S. capital abroad. It is pointed out the major factors that are attractive to businessmen to establish plants abroad is the feasibility of

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foreign investment in currency that is convertible, economic and political stability, and the lesser cost of production ranging from labor to taxes and materials. The Secretary had the help of 400 American companies in making a survey. It is urged that many of our laws, which are now an obstacle to the development of private investment overseas, must be changed.

Interesting reports were issued recently, almost simultaneously, by the Small Business Administration and the Foreign Operations Administration. Each had to do with the supply of funds to business people. Of course, the SBA simply loans money to American industrialists and businessmen, while the FOA apparently supplies funds to all the world in order to speed up the development of industry and business in widely separate and remote foreign countries. The contrast was extremely interesting; for instance, we have an exact report of the number of workers affected by the SBA operation. Obviously we don't know how many come under the FOA deal. In this country the SBA arranged to make a totality of loans aggregating \$1,059,500. This money went to twelve states, and helped in the employment of 757 workers in machine tool plants.

The total allocated by the Foreign Operations Administration to be used by foreign operators for machine tool work was \$20,089,880. It is particularly noteworthy that Lebanon, one of the ancient Biblical countries, next door to Palestine and Syria, was given an appropriation of \$30,000,000 to begin the study and the preliminary work in the building of dams and other water conservation operations. It is to take from twenty to thirty years to finish this Lebanese dam-building project, and will cost \$100,000,000, apparently to be supplied by the United States. This is consistent with the present program to develop foreign undertakings.

The machine tool projects, either to be undertaken locally, or to be supplied from the United States and other countries, are destined for Spain, Greece, Israel, Lebanon, Korea, Indonesia, Turkey and India. It is interesting to note that the business of supplying the machine tools is spread over Europe and Asia. Japan is mentioned as a potential source of supply as well as the Philippines, Australia and New Zealand.

R. M. Rentschler of Cincinnati, Ohio, has dug out the figures which reveal the annual income of some of the leading labor unions. International Ladies Garment Workers Union—\$69,600,000; International Brotherhood of Electrical Workers—\$28,7000,000; United Mine Workers—\$24,900,000; United Automobile, Aircraft and Agricultural Implement Workers of America—\$20,800,000; United Steel Workers of America—\$13,800,000; International Brotherhood of Teamsters, Chauffeurs, Warehousemen, etc.—\$13,200,000; National Association of Machinists—\$9,600,000; United Brotherhood of Carpenters and Joiners of America—\$8,800,000; Brotherhood of Railroad Trainmen—\$8,400,000; Textile Workers Union of America—\$4,200,000.



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How's BUSINESS ?

New tax laws provide substantial advantages

Cleveland . . . Financial executives concerned with the problem of rate of recovery of capital invested in productive equipment will be interested in the Internal Revenue Act of 1954 which contains two new options with respect to depreciation.

The National Machine Tool Builders' Association deals with the new options in considerable detail, and stresses the provisions of the new law do provide substantial advantages over those of the old.

The machine tool industry has for years pointed out to House and Senate tax committees the extent to which the depreciation provisions of the old law have acted as a brake upon modernization.

With the so-called "useful life" of a machine, as enforced by the Internal Revenue Service, extending far beyond its actual profitable life, only a portion of its cost could be recovered through depreciation allowances by the time the machine should be replaced by a new one.

This was a serious deterrent to replacement programs. It resulted, in fact, in tax enforced obsolescence. Furthermore, it was not realistic. Instead of reflecting sound replacement practices, it had become a device of taxation expediency.

The machine tool industry, year after year, presented arguments on behalf of acceleration of depreciation more in

line with the real "useful and profitable" life of production equipment—and also urged that the taxpayer be given at least some range of option as to rate write-off.

Both of these principles have been recognized to a limited extent in the new tax law. The permitted degree of acceleration is less, and options lie in a smaller range than it is hoped may eventually be allowed. It is, however, of vital significance that the option principle has now been written into the nation's tax structure.

The chief optional provisions under which a company may, if it chooses to do so, write-off machine tools at a faster rate than the straight-line method are the following:

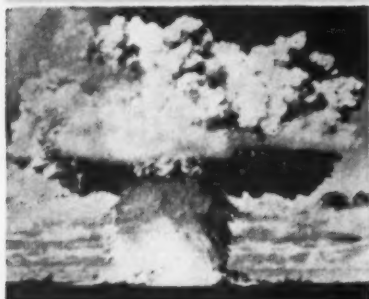
The double declining balance method, under which a company can write off about two-thirds of the original cost in the first half of the machine's tax life;

The sum of the digits method, under which a company can write off about three-fourths of the original cost in the first half of a machine's tax life.

From the standpoint of investment of capital this is an advance in the right direction, for it means that a company purchasing a new machine tool can recover a larger part of its cost during the period of reasonably foreseeable risk, and the period of profitable life of the machine.

The following table succinctly points out the advantages of the new law:

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Straight-line	\$5,000
Declining balance at 150% of straight-line	\$4,585
Double declining balance	\$3,487
Sum of digits	\$2,619

Section 167 of the new tax code authorizes the use of the declining balance method of depreciation at double the straight-line rate. This means that a taxpayer acquiring a \$10,000 machine with a tax life of 20 years will be able to write off 10% (twice the straight-line rate of 5%) in the first year, 10% of the undepreciated \$9,000 in the second year, 10% of the then undepreciated balance of the \$8,100 in the third year and etc., etc.

"Double declining balance" depreciation leads to a write-off of roughly two-thirds of original cost in the first half of a machine's tax life. Then in the second half, the annual deductions fall off sharply, and a substantial balance remains at the end of the 20th year. In the case of a \$10,000 machine, this balance amounts to \$1,216.

Section 167 also authorizes depreciation according to the "sum of digits," a method first suggested to the Senate Finance Committee by Mr. R. W. Banfield, as Chairman of the National Machine Tool Builders' Association's Committee on Tax Policy. Under this method, each annual depreciation charge is a fraction of the original cost, the numerator of which is the "reverse year" of the machine's life and the denominator is the "sum of the digits." In the case of the first year's depreciation charge on a 20-year machine costing \$10,000, the "reverse year" is 20, for the second year 19, for the third 18, etc. The "sum of the digits" is 210 ($1 + 2 + 3$, etc., up to and including 20 equals 210). The first year's charge would therefore be $20 \times \$10,000$ or \$952. The

210

"reverse year" of the second year is 19, but the "sum of the digits" is still 210 and the second year's charge would therefore be $19 \times \$10,000$ or \$905. The

210

third year's charge would be $18 \times$

210

\$10,000, etc., etc.

The "sum of the digits" provides slightly smaller depreciation deductions than "double declining balance" during the first two years of a machine's life. But the "sum of the digits" catches up in the third year, and over the first half of service life it permits the write-off of almost three-quarters of the original cost as compared with the two-thirds allowable under "double declining balance." It also has the advantage of providing a full write-off over whatever estimated life is adopted.

The new law permits a shift from declining balance to straight-line depreciation in any year. Under some circumstances this may make it possible for a taxpayer to take advantage of the relatively large write-offs permitted by "double declining balances" in the first years of a machine's life, without the penalty of relatively small write-offs during the last half.

It is true that under the old law it was possible to use declining balance depreciation at 150% of the straight-line rate. But under the old law, substantial efforts had to be made to justify the use of declining balance depreciation and taxpayers were by no means uniformly successful in establishing the propriety of its employment.

Under the new law, "double declining balance" or the "sum of the digits" can be used without argument or justification, and their dollar advantages over 150% declining balance depreciation are by no means inconsiderable.

The new law will unquestionably stimulate many companies to refigure

**TABLE AND CHART OF REMAINING UNDEPRECIATED
BALANCES ON \$10,000-UNIT, OVER 20 YEARS**

End Of	Straight Line 5%		Double Declining Balance		Declining Balance at 150% of Straight Line		Double Declining Balance 10 Years; Straight Line Thereafter		Sum of the Digits	
	Deduction Balance		Deduction Balance		Deduction Balance		Deduction Balance		Deduction Balance	
1st Year	\$500	\$9,500	\$1,000	\$9,000	\$750	\$9,250	\$1,000.00	\$9,000.00	\$952	\$9,048
2nd Year	500	9,000	900	8,100	694	8,556	900.00	8,100.00	905	8,143
3rd Year	500	8,500	810	7,290	642	7,914	810.00	7,290.00	857	7,286
4th Year	500	8,000	729	6,561	594	7,320	729.00	6,561.00	810	6,476
5th Year	500	7,500	656	5,905	549	6,771	656.00	5,905.00	762	5,714
6th Year	500	7,000	591	5,314	508	6,263	591.00	5,314.00	714	5,000
7th Year	500	6,500	531	4,783	470	5,793	531.00	4,783.00	667	4,333
8th Year	500	6,000	478	4,305	434	5,359	478.00	4,305.00	619	3,714
9th Year	500	5,500	431	3,874	402	4,957	431.00	3,874.00	571	3,143
10th Year	500	5,000	387	3,487	372	4,585	387.00	3,487.00	524	2,619
11th Year	500	4,500	349	3,138	344	4,241	348.70	3,138.30	476	2,143
12th Year	500	4,000	314	2,824	318	3,923	348.70	2,789.60	429	1,714
13th Year	500	3,500	282	2,542	294	3,629	348.70	2,440.90	381	1,333
14th Year	500	3,000	254	2,288	272	3,357	348.70	2,092.20	333	1,000
15th Year	500	2,500	229	2,059	252	3,105	348.70	1,743.50	285	714
16th Year	500	2,000	206	1,853	233	2,872	348.70	1,394.80	238	476
17th Year	500	1,500	185	1,668	215	2,657	348.70	1,046.10	190	286
18th Year	500	1,000	167	1,501	199	2,458	348.70	697.40	143	143
19th Year	500	500	150	1,351	184	2,274	348.70	348.70	95	48
20th Year	500	0	135	1,216	171	2,103	348.70	0	48	0

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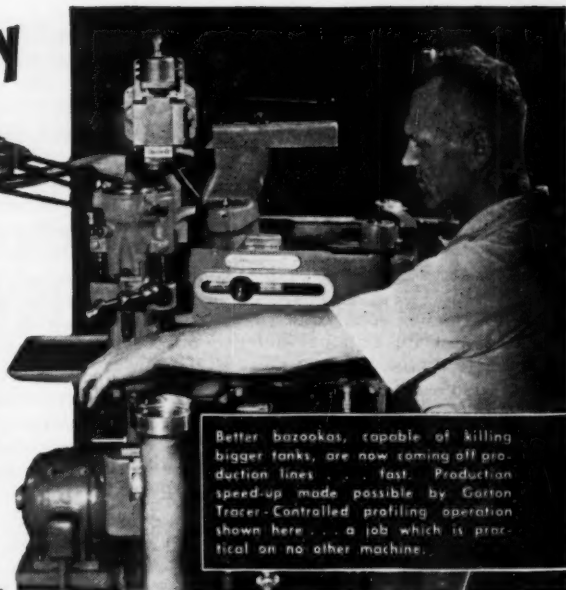
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PRODUCTION DATA—

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H.S. steel running at 3,900 R.P.M., without coolant

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical

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arithmetic with respect to contemplated replacement programs.

Machine Tool Shipments

Cleveland . . . Machine tool shipments for the first half of 1954 totalled \$538,350,000, as compared to \$639,550,000 for the first half of 1953, and \$551,650,000 for the second half of 1953.

With foreign shipments in the first half of this year accounting for only 8.3% of the total, and deliveries to government for national defense purposes substantially below those of the previous year, the 1954 first half shipments figure indicates very substantial machine tool buying on the part of domestic manufacturers in the metal working field, chiefly for replacement purposes.

This trend will be accelerated as a result of the passage of the new tax law. The current up-turn in sales suggests that in anticipation of its passage buyers of machine tools have already begun to activate long-planned replacement programs.

With shipments of machine tools previously ordered for national defense now practically completed, builders are in a position to give immediate consideration to customer requirements.

Vance Plan

Cleveland . . . Defense authorities appear now to be committed in principle to the Vance Plan—which is in substance that instead of building military end items, we should instead build and install, if possible, ready for use, the production equipment, including machine tools, required to build the long lead-time items should an emergency arise.

The plan also contemplates that all government-owned machine tools useful for military production should be retained by the government on location or in warehouse as a national defense reserve; and that the government

should sell only such machines as in no way can contribute to defense.

The congress has now appropriated \$100,000,000 for Vance Plan purposes, and has extended the authority of armed services to make procurements of the Vance Plan type.

Meanwhile an inventory and examination of all machine tools owned by the government on behalf of the building of the national defense reserve is under way. Special teams have been out in the field checking accuracy of the Defense department's records, the completeness of its information, and the actual physical condition of the machines. This has been done with the cooperation of representatives of machine tool builders, machine tool distributors and users of machine tools.

While apparently no decision has been reached on the projects for which the \$100,000,000 will be expended, the Vance Committee has suggested the first move should be in the direction of the so-called "elephant" machines—large machine tools vital for military production which require a long lead-time for their manufacture. The Defense Department has been urged to compile a list of its needs for such machines.

Full implementation of the Vance Plan would require at least a tentative list (subject to change) of the weapons which the Defense Department thinks would be needed in the event of war. Thus far apparently no such list has been made.

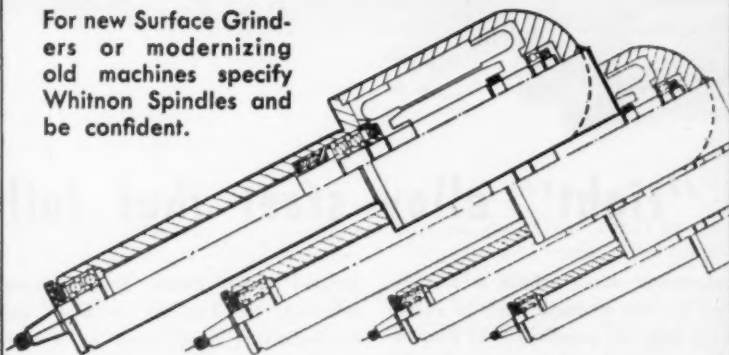
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Understand Cutting Forces For Better Machining Practice

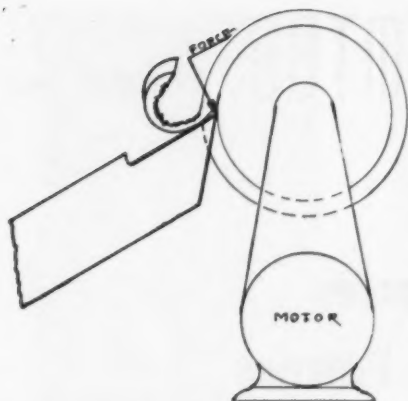
By **Horace A. Frommelt**, Consulting Engineer

THE CUTTING force required to move metal in a machine tool is the most important aspect of machining. If these forces are clearly conceived and understood, a successful job is assured providing only these forces are properly taken care of in the cutting tool itself, in the workpiece, and in the machine. This will result in selecting and applying the tool properly; the setting up of the workpiece will then be done soundly and well and, finally, the machine will be operated according to common sense and good metal removal principles. All of this can flow from properly conceiving a metal removal job clearly

in terms of the forces that are generated when the tool comes into contact with the workpiece.

At bottom a metal removal job resolves itself into pounds of force acting at the cutting edge on the workpiece. This is true whether the operation is being performed with a chisel and hammer or with benefit of a modern machine tool in which spindle and feeds are driven by electric motors. All of the horsepower in the main drive of a machine tool appears as a force of so many pounds at the point or edge of the cutting tool when the metal is being removed, figure 1.

Every machining job can be visualized in terms of a set of forces. Properly understanding these forces aids in getting better workmanship. Increasing the sfm reduces cutting forces . . . reduces heat. Clamping of work, tool selection, machine tool selection are influenced by cutting forces.



1. All the horsepower in the main drive of a machine tool appears as a force of so many pounds at the point or edge of the cutting tool when the metal is being removed.

As will be seen shortly, horsepower is an expression for energy. In the simple classroom method of presenting force and work and energy the physics text books refer to force in terms of pounds which represent the push or the pull that can be measured, in our English system, by means of a spring balance or similar measuring device. The term and concept of "Work" goes an additional step to unite this force with a movement or distance. In other words, if a force moves a certain distance work is being done. Thus, if a force of one hundred pounds is being lifted a distance of one foot then the amount of work accomplished is one hundred foot pounds. Merely multiply the number of pounds of force by the distance through which the force acts, figure 2.

It is well to pause here to note that the element of time is not considered in the meaning of work. Whether the hundred pounds is lifted through one foot in one second, one minute, or one hour does not in any way change the

amount of work that is being done. Work is simply force acting through a distance.

If a steam engine piston measures 12" in diameter and the steam pressure is 100 pounds per square inch then the total number of pounds acting on the piston is approximately 11,300 pounds. If the length of travel is 3' then the work accomplished when the force of the steam acting on the piston through the distance of 3' is equal to 33,900 foot pounds. Note that we have not as yet any idea of the rate at which the piston is being moved from one end of the cylinder to the other.

Now comes the concept of energy which goes an additional step, involving the element of time. Energy is work done in a specified period of time. Usually time is measured in seconds or minutes. If one thousand foot pounds are acting in one minute then the measure of the energy developed or applied is one thousand foot pounds per minute. If these same one thousand foot pounds are exerted or applied in one second then the energy is expressed as one thousand foot pounds per second. Obviously the thousand foot pounds that are working in a span of one second are producing 60 times more effect than when the same thousand foot pounds are being applied over a span one minute. To return to the example of the steam engine with a 12" diameter piston moving in a three foot long cylinder with one hundred pounds of steam per square inch pushing it: if a crank is revolving at one hundred revolutions per minute, then the number of foot pounds per minute will equal 43,200 foot pounds times one hundred or 4,320,000 foot pounds per minute.

Energy, according to the physicist, is work exerted in a specified period of time or work performed at a specified rate. The foot pounds per minute method of expressing this energy is, to say

the least, clumsy. Hence, it has been customary for the better part of 150 years to express energy in terms of horse power. In English speaking countries it is arbitrarily accepted that 33,000 foot pounds per minute, or 550 foot pounds per second, equals one horse power.

It has been necessary to develop this idea of force and work and energy and, finally, the horse power since it is the basis of our forces as they are developed when metal is removed in machining. We begin with a source of power such as an electric motor which is definitely rated in terms of hp. Hence if a lathe is powered by a 5 hp motor then it is possible to determine the number of foot pounds per minute at the cutting tool. This 5 hp equals 165,000 foot pounds per minute.

We are now not too far from the concept of force at the point of the lathe tool. The foot pounds per minute are being exerted or delivered through the point or along the edge of the tool in the tool post on the lathe. What we are finally interested in, however, is the number of pounds of actual force that is being applied when the lathe tool removes its curled chip from the work piece.

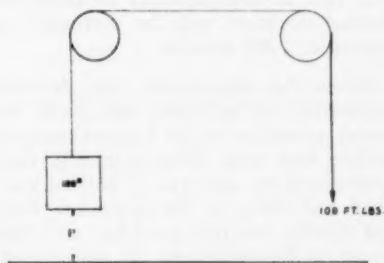
Let us assume that we are turning a 1' diameter roll in this lathe. Also, that we are using a carbide cutting tool. Further, let us assume that the surface foot rate for this turning operation on this piece of steel—for the 12" diameter roll is a piece of steel in this case—is 150 feet per minute. (Incidentally the 1' diameter steel roll which is being turned must be revolved approximately 50 revolutions per minute in order to give us a surface foot rate of 150 on the surface of this roll. The important point here is that the carbide cutting tool in a lathe of the type under discussion can be operated at a surface foot rate of 150, or thereabouts. For

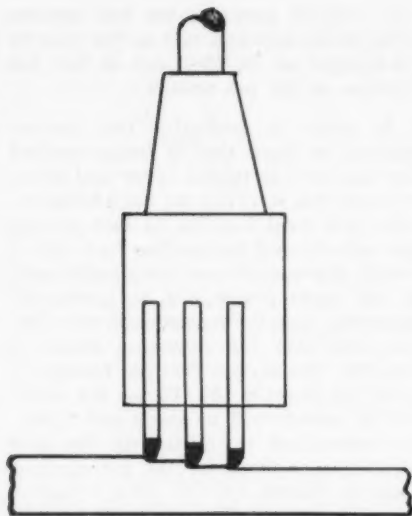
our present purposes we will assume that the surface foot rate or the velocity of a point on the steel roll in feet per minute, is 150' per minute).

In order to determine the number pounds of force that is being exerted by the carbide tipped lathe tool when it turns this steel roll we need to determine the total number of foot pounds per minute and the surface foot rate at which this operation is being performed. If the horse power is 5, as previously assumed, then the foot pounds per minute available for removing metal is 165,000. The surface feet per minute as just laid down is 150. Hence the number of pounds will be easily and quickly determined by dividing the foot pounds per minute by the surface foot rate or 165,000 by 150. The result is something over 1,000 pounds. This gives us the actual pressure that is being developed between the roll and the tool.

It is interesting to note that in the lathe operation the workpiece is being driven by the main spindle motor while the tool is being fed into the work by means of the lead screw which is in turn driven by the same motor. The primary forces in this metal removal operation are developed by or through the workpiece or the roll. It is therefore true to say that the roll is press-

2. Foot pounds is the number of pounds of force multiplied by the distance through which the force acts.





3. By reducing the feed rate in the same ratio as reducing the number of teeth, it is possible, in this specific milling operation, to reduce the cutting pressure.

ing against the tool with something over 1000 pounds; to be exact 1,100 pounds.

Before proceeding further it is worthwhile to note that as the surface foot rate increases the pressure decreases. If it were possible to operate this lathe at a surface foot rate of 300 feet per minute then the pressure developed between the roll and the lathe tool would be 500 pounds. Conversely, if the surface foot rate is decreased to 75 then the cutting pressure will be increased to double or 2,200 pounds.

Hence the importance, the extreme importance, of operating any metal removal operation at the highest possible surface foot rate. This is usually first determined by the type of cutting material and then by the operation itself and finally by the machine and the power in the machine. At the outset,

however, it is important to note that going from a high speed steel tool to carbide the surface foot rate is doubled or increased to as much as three times. This immediately brings the same operation into the category of a metal removal job in which the forces have decidedly less effect than previously. Obviously, the effect on the machine, the workpiece, the method of holding, etc., are all affected by this prime fact, namely, the rate at which the metal is being removed or what is commonly referred to as the surface foot rate which is designated as S.F.M. (surface feet per minute).

Before proceeding with the discussion of cutting forces in milling it cannot be too much emphasized that the actual number of pounds of force developed between the cutting element and the workpiece depends: first, upon the amount of power or energy that is being applied to the job; secondly, the surface foot rate at which the application of power is being made.

Not only is the problem of harnessing, controlling and directing these cutting forces so important to machining or metal removal, but another important fact must be clearly understood and appreciated in doing metal removal work. When it is necessary to machine to a tolerance of .001" or less these forces play a very important part, not only indirectly through the effect on the workpiece and the machine, but directly.

A simple physical law is at work when metal is being removed on a machine tool. The forces exerted between the cutting tool and the workpiece, of which we have had considerable discussion by way of an introduction, are converted into heat. All energy that is mechanical to start with, such as the foot pounds per minute delivered to the cutting point or edge of a tool and which appears at that point in terms of pounds, all that energy is converted

into heat. Foot pounds per minute are directly related to British Thermal Units or Calories and can be so converted. We know this from everyday practical machining operations.

In a boring operation where the accuracy is called for in tenths of a thousandth of an inch, it becomes extremely important to appreciate this conversion of mechanical energy into heat in order to perform a good operation. In other works the cutting pressures are reduced to the smallest possible minimum by reducing the width and the depth of the cut, or the rate of which these factors determine the number of foot pounds of energy required, and hence determine the number of pounds of pressure between the cutting tool and the workpiece. Moreover, a skilled mechanic performing an operation such as this will not only take a series of light borings but will allow a sufficient interval of time between each cut so that the heat which has been developed from and by the mechanical energy will have been dissipated and will not affect the workpiece by way of distorting it.

These are all well known facts and considerations that the mechanic who is skilled in this type of metal removal observes consciously. Yet, the basic reason for their observation comes from the simple fact that forces are at play when metal is being removed which in turn have a two-fold effect. They push and pull on the tool, the workpiece and the machine, and they also appear in the form of heat. When this is sufficient to distort the workpiece, and frequently the machine members themselves, by expansion, then the problem of appreciating the existence of these factors and controlling their effect in the form of heat becomes an important one.

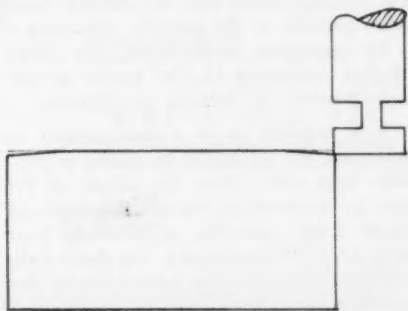
Perhaps we can dive into the depths of this discussion by considering first the effect that these cutting forces have

or should have on the choice of a tool, a cutter and even a machine for the doing of a certain piece of work. If the metal removal operation carries with it close tolerances it may be necessary to give full consideration to the type of tool or cutter to be used or sometimes even the machine. Such consideration may be necessary even though close tolerance work is not called for. This is true when it becomes necessary to machine a workpiece that presents difficulties due to thin sections and similar annoying characteristics that are all too frequent in the life of the metal removal artist.

This portion of the discussion concerning the effect of the cutting forces on the choice of tools can best be illustrated by assuming the following conditions.

We are faced with the problem of milling a flat surface. The tolerances for flatness are very close; a milling machine with reasonable power, say 10 to 15 hp, is available with cutters ranging from slab to face mills, step mills and fly cutters. To better illustrate the problem confronting us it is possible that the job may even be done on a suitable planer or shaper. A prime

4. As more teeth of the milling cutter are engaged and maximum pressure is applied the spindle is pushed away from the workpiece.



consideration is that the flatness must meet certain conditions to be determined by a surface plate, etc. If this operation is approached by properly visualizing the effects of the cutting forces both directly and in terms of their twin, namely, heat, then it is quite likely the results will be satisfactory. Given reasonable craftsmanship manipulations of the machine and the set-up of the workpiece, the success or failure of the job will be determined largely by the clearness with which these cutting forces are conceived. If this all important factor in machining is clearly pictured when this operation is being considered, the slab mill will be immediately ruled out. If the conditions are right and a carbide milling cutter is available it is quite possible that a suitable face mill can be specified. The difference between the slab mill and the carbide face mill is largely one of surface foot rate. Since slab mills cannot use carbide inserts a high speed steel cutting element must be used. The maximum foot rate for a slab mill could not possibly be specified higher than 60 surface feet per minute. If the workpiece is a normal SAE 1020 steel the carbide face mill can today be operated at surface foot rates in the neighborhood of 1000. Hence the cutting forces would be reduced by almost as much as 20 times with a carbide face mill. The effect on the flatness of the operation will be immediately apparent. Since the cutting forces will be reduced from 3,300 pounds to 165 pounds, assuming a 5 hp operation is involved, the effect of this reduction in the forces on the requirement of flatness is obvious.

It is possible to go a step further in reducing the pressure by using a carbide step mill. Here the depth of $\frac{1}{8}$ " can be removed in three steps—two of them $\frac{3}{64}$ " and the third and final step $\frac{1}{32}$ ". Here, since the feed rate will be reduced in the same ratio as the reduction in the number of teeth, it is

further possible to reduce this cutting pressure of 165 pounds previously referred to, figure 3.

If we are to continue with the consideration of milling as a method of metal removal then we can go one step further by using a fly cutter. This will still further reduce the pounds of pressure, the heat. It must be remembered, as the pressures are reduced we not only affect the reaction of the workpiece (such as by distortion) but we also change the effect on the machine. In a milling machine with a face mill mounted on the spindle the less the pressure the smaller the amount of the movement of the spindle away from the workpiece. This becomes extremely important when flatness is a prime consideration. Using the accompanying illustration for this discussion it is clear that as a cutter enters a workpiece, the pressures developed between the cutter and the workpiece increase as more of the cutter engages the workpiece. With the entrance of one tooth at the be-



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ginning of the cut there is a slight tendency to push the spindle away from the workpiece. As more teeth are engaged the pressure increases until the entire cutter is engaged and the maximum pressure is being exerted to push the spindle away from the workpiece. The opposite is true, when the cutter begins to leave the workpiece the pressures begin to reduce; the greatest reduction has taken place when one half of the cutter has moved off the job. Actually, the appearance of this surface in an exaggerated way can be illustrated in the accompanying sketch, figure 4.

Obviously if the total pressure by the cutter is reduced by increasing the surface foot rate or by using a step mill or finally by using a fly cutter this effect on the spindle will be increasingly reduced. How much, can best be

appreciated by rehearsing the figures previously given for this operation. With a slab mill on a 5 hp machine running at 60 sfm the cutting pressures would be in the neighborhood of 3,300 pounds; with a carbide face mill the cutting pressures will be reduced to 165 pounds, if the operation can be performed at surface foot rate of 1000. The effect upon the spindle movement which we have just considered is obvious. While the movement of the spindle increases as more of the cutter engages the workpiece (and conversely, as the cutter leaves the workpiece), the movement will be drastically reduced as we choose a carbide face mill rather than a slab mill, or a step mill rather than a carbide face mill. (It is here assumed that the step mill and fly cutter are carbide cutters.)

It may even be necessary in some

Tool Trays for Engine Lathes

By C. T. Mischief

WHEN using an engine lathe, the operator requires various small tools such as micrometers, callipers, rules, taps, drills, small gages, etc., and there is never any suitable place on the lathe for keeping them safely. Most operators place small tools on some part of the machine saddle with the unfortunate results that they get knocked off into the swarf tray or become saturated with coolant.

Some large lathes have extensive flat areas on the saddle casting which will accommodate a reasonable number of tools in safety, but the small lathe provides very limited space for this.

A common practice is to have a wooden tray straddling the bed slides for the purpose of keeping small tools handy. This tray is usually placed to the right of the tailstock, and, on large lathes, it is too far away to be used in comfort, whilst on small machines with limited bed length it is often more of a nuisance than an asset as it limits the sliding of the tailstock.

One idea which goes a long way to providing a fair amount of small tool storage space on a small lathe is illustrated in figure 1. Here, a small tool tray

has been mounted on the lathe tailstock casting. The tray shown is made from plywood and has vertical supporting members which are band sawed to a shape which forms legs for straddling the exterior of the tailstock casting. The shape of the legs is such that they support the tray in a level position and prevent it from swivelling around on the circular top of the casting whilst, at the same

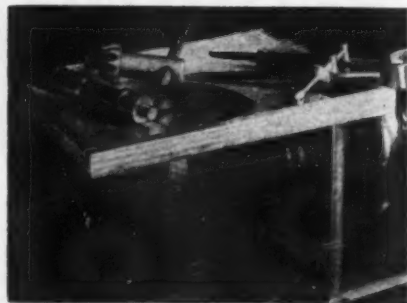


Figure 1.

IT'S A HAMILTON



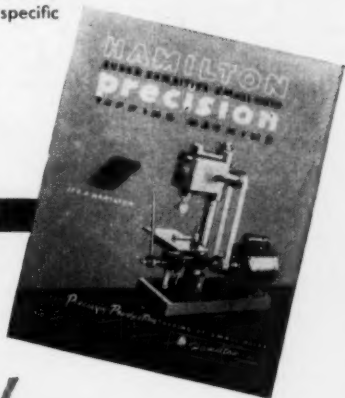
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operations to choose a planer instead of a milling machine. Other things being equal, a planer will produce less effect on the workpiece and make possible machining to greater tolerances for flatness. If the horsepower considerations are passed by and a single point tool operation of the planer is specified then it should be possible to come up with better flatness. The single point tool of the planer is likely to have less effect on flatness than the face mill on a milling machine. However, if a fly cutter is used, as is possible on a milling machine, then the effect should be comparable and the result in flatness due to the effect of the cutting forces should be approximately equal. Sometimes the arguments concerning which machine is to be preferred, a milling machine or a planer, can best be understood and resolved if cutting forces are clearly understood and taken into consideration.

If this same surface is part of a com-

ponent having a large cavity then the machining of that surface to close tolerances for flatness becomes even more difficult and the problem of cutting forces even more important. At times it becomes necessary to violate all good rules concerning the operation of carbide tools for maximum or economical life. It may be necessary to operate a carbide cutting tool at rates above the economical life limit to reduce the cutting pressures by increasing the surface foot rate. Thus it would be possible to mill to a flatness otherwise impossible. Let us see what an increase will do for this operation.

For this purpose we return to our 5 hp machine with its 165,000 foot pounds per minute. If the sfm rate is increased to 2,000 then the cutting pressures will be reduced to 82.5 pounds. The point is that the desired result will not be obtained unless the true relationship between sfm and cutting forces is clearly understood. Let us be clearly remem-

time, the complete assembly may be removed by merely lifting it away.

It has been found possible to leave the tray in position for practically all the normal general work performed on the machine. The tray has been designed to allow for normal working of the tailstock, such as locking it to the bed, locking the barrel and working the hand-wheel. On the lathe shown, the two locks

are at the back of the tailstock and are particularly convenient, allowing a tray of large area in relation to the size of the casting. Some lathes to which a similar tray has been fitted have a barrel lock protruding from the top of the casting and space had to be provided for the operation of this by making the tray short in length. On lathes of about 16" swing it has been possible to mount a tray of a very ample size on the tailstock casting.

A further application of small tool trays to lathes is shown in figure 2. In this instance, the tray is mounted on the top slide casting just behind the tool post and whilst the example shown is very small, owing to the limited space available, it has been found to serve a very useful purpose on small tool turning jobs. For instance, a tray as small as the one shown is ideal for holding thread measuring wires, wires for gauging the diameters of tiny holes, the ball attachment used on a micrometer for measuring wall thicknesses and similar small auxiliaries.

Larger lathes can accommodate a surprisingly large tray on top of the compound slide casting without causing any interference with the normal lathe operation.

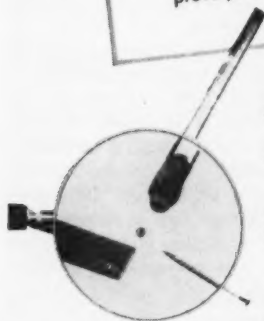


Figure 2.

PRECISION GEARS

YOU who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production.

YOU who use small, fine pitch, precision gears can increase your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.



The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.



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bered that in this example if the sfm rate is increased to 2,000 we are not only reducing the pressure from 165 pounds to 82.5 pounds and thus effecting a reduction in the distortion of the surface we are machining but we are also reducing the effect of misalignment and movement of machine tool members, such as spindles, tables, etc. For, immediately that we increase the surface rate we not only accomplish a reduction of the pressures on the workpiece but also those that are annoying the machine. Further, to refer to our previous discussion concerning the relationship of mechanical work and heat, we are reducing the amount of heat generated in the workpiece and hence the possibilities of distorting that surface. Finally, we are affecting the fixture and its holding of the workpiece. If the cutting pressures are reduced it is no longer necessary to clamp the workpiece so tightly as was necessary previously. This in turn means less distortion and hence less bad effects on our machining operation. For example, if a flat surface is being machined and large pressures are being used it becomes essential that the hold down methods are correspondingly massive and rigid. The more and tighter our clamping the greater the distortion of the workpiece. After this surface is machined the distortion is removed. What we thought was a flat surface is now distorted into a convex or concave surface. Reduce the cutting pressures and the necessity for such rigid and damaging clamping is also removed, and the effect on the final results will be correspondingly small.

Since the days of carbon tool steel as a cutting element in our machine tools to the present age of carbide we have come a long way in reducing cutting forces. Carbon tool steels were operated at surface foot rates that are but a small fraction of those that are necessary today with modern cutting material. A carbon tool steel milling

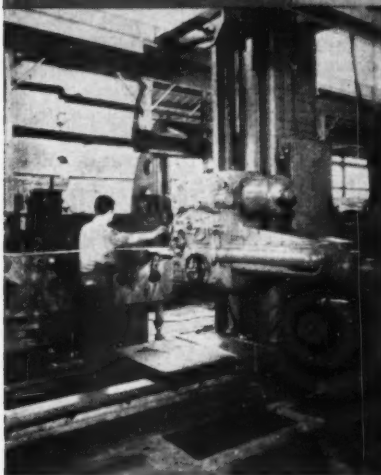
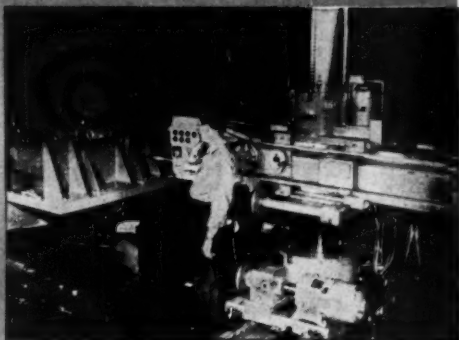
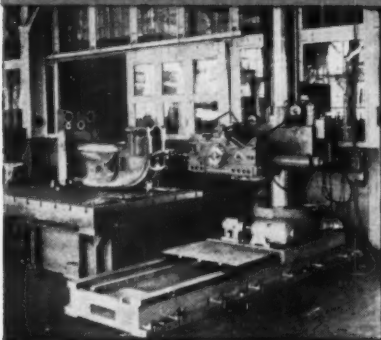
cutter was necessarily operated in the neighborhood of 20 to 50 sfm. High speed steel which appeared in milling cutters shortly after the turn of the century brought the sfm rate up to approximately double that figure. With the advent of super high speed steel cutting materials the sfm rates for the run-of-the-mine steels jumped to 100. But the greatest increase took place during the past 25 years with the appearance of carbide as a cutting element. That in itself is an interesting story but the important point here is that as the sfm rates increased from 20 feet per minute as prevailed during the middle of the last century to 1,000 feet per minute as current today the cutting pressures have been reduced as much as 50 times. To make this more tangible let us assume that we are dealing with a 10 horsepower milling machine which today is considered in the lower brackets of power. Yet this 10 hp milling machine will deliver 330,000 foot pounds of energy per minute. If this bundle of energy were used at 20 sfm rates per minute, as was necessary with carbon tool steels, then 10 hp would be converted into 16,500 pounds, or better than eight tons of pressure between the cutter and the workpiece. The same bundle of energy delivered at 1,000 sfm reduces the pressure between the tool and the component to 330 pounds—a reduction from better than eight tons to considerably less than $\frac{1}{4}$ ton.

The effects of such pressure decreases on cutter life, machine tools and workpieces are easily surmised. Some of them will be discussed in detail in an article that follows and which will deal directly with these cutting forces and their possible effect on such factors as the choice of a cutter, its positioning, the holding of the workpiece, the effect on tolerance machining and other important considerations that characterize present day machining operations.

The End.

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Time Study . . . part 3

Levelling . . . Set-up . . . Allowances

By **Harold R. Nissley**
Professional Engineer
Cleveland Heights, Ohio

What is the Best Method of Levelling?

THE BEST method of levelling is the one with which the user has the greatest success! Like so many other facets to industrial engineering there is no one method that can be considered "best." Without going into a discussion of the various methods of rating or levelling which have been discussed in part, at least, in earlier articles, the writer will present the method he employs in his own time study work.

I "speed rate" an operator's performance at "high task" using a percentage system of rating or levelling. Years ago I rated each individual time study observation—a flash impression of the operator's speed of performance during the time of the elemental work performance. This meticulous rating technique interfered with the accurate timing and recording of data; so I dropped this incremental rating in favor of an elemental rating technique. This elemental rating is frequently done at

the end of time recordings by concentrating on the speed of performance of the operator in his various motion patterns; I will speed rate each element two, three, or five times realizing that any of these ratings may be off by as much as 20 or even 30 per cent. This is the method I employ where the cycle time is short; when quick results are desired; where there are no available check or standard data; and/or when I am not too familiar with the operation.

But even this elemental rating is cast aside, when not pressed for time under certain conditions in favor of over-all ratings. In an over-all rating I show (at the bottom of my observation sheet) my percentage judgment of the over-all performance of the operator. Then I adjust individual selected elemental time observations in conformity with this over-all rating on the general theory that a slow operator will not perform one element fast and another element slow; but a slow operator, generally, will be consistently slow

Editor's note: So great was the response to our questionnaire which appeared in the August issue of the BLUE BOOK that we have asked Mr. Nissley to devote at least one entire article to answering those questions which seem of greatest interest to our readers. So, while these questions are still fresh, and as a service to our technical and operating readers, we are asking Mr. Nissley to pin-point his remarks to cover some of these questions. Questions not covered in this issue will either be treated in the main text of future articles or in another question-and-answer article. What are your thoughts?

Topics receiving largest number of check marks in the August BLUE BOOK questionnaire are:

1. What is the best method of levelling?
2. When is the job ready to be time studied?
3. What is a normal operator?
4. What are proper allowances?
5. What are the proper fatigue allowances?
6. How do you handle unavoidable delay allowances?

Question 3 was covered in the September issue of the BLUE BOOK. Questions 4, 5, and 6 have sufficient in common so they will be handled together in this article.

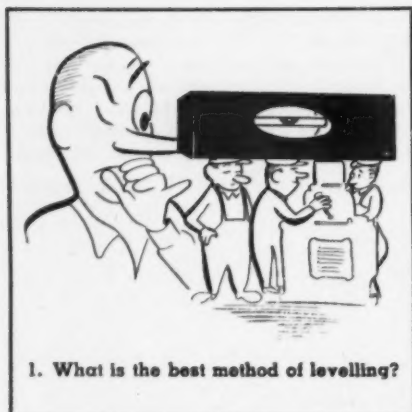
throughout; and a fast operator will not only move his fingers and arms rapidly but will walk and do other things rapidly. Many of my industrial engineering contemporaries will disagree with this point of view; but my experience indicates the over-all rating technique yields consistently reliable results within the plus or minus 10 per cent tolerance limits most time study observers attempt to operate within under many operating conditions.

As indicated elsewhere in this series of time study articles, the levelling of times or rating of operators becomes less significant as the number of time studies on different operators (and on different days) increases. Thus a work standard based on five or ten studies of five to ten operators is probably more reliable than one based on a single study notwithstanding the careful rating judgment exercised by the time study engineer in this single study. Standard data, an outgrowth of these multiple time studies, should be the ultimate objective of most stop-watch time study engineers.

When is the Job Ready to be Time Studied?

Frequently a foreman will request a work standard on a job before he has "completed" his work in setting the job up. When the time study observer looks the job over he discovers a lot of things which he knows will change after he sets a standard on the job. The observer has a number of choices open to him: (a) Refuse to set a standard on the job until the job design has jelled firmer; (b) put a temporary standard on the job and so mark it; (c) indicate the possible future course of the job by marking after the standard the probable tolerance limits (e.g. plus or minus 50%).

a. **Refuse to Set the Standard.** When a conservative time study observer refuses to set a standard on a job "because it is not running right," the foreman frequently will appeal to the superintendent and tell him he can't get any production out of his operator(s) until a "price" is put on the job. The super-



intendent having gone through such hassles before then decides whether immediate production is more important than a possible wild rate. But in making this decision the superintendent also is appraising the caliber of his foreman and/or his time study engineer; a good foreman will not throw up his hands every time one of his automatic tools (piece rate in this case) becomes inoperative; nor will a good time study man always wait for job designs to be just right before setting standards on them.

b. Temporary Standard. A common way out of the new job design dilemma is to set a temporary standard and tell all parties concerned that the standard is temporary. There are, however, several objections to temporary standards: (1) Temporary standards frequently become permanent because no one takes the trouble later to restudy the job and note the changes that have taken place (unless the temporary standard is so obviously loose that the operators' earnings are out of line). (2) Temporary standards are frequently a signal for operators to "hold back" until permanent standards are set in the belief (and with some justification) that, if they put forth their highest effort

and earn something more than the anticipated piece rate earnings, subsequent time studies of the job will correct earlier errors as well as recognize recent short-cuts. (3) Temporary standards frequently encourage laxity on the part of the time study engineer and/or the foreman; both of these men know that they can get by with a superficial study or poor job design, if they are not going to be "stuck" with a quick or loose standard forever. Because of these disadvantages many contracts now have a 30 day clause whereby any piece rate becomes a permanent rate after 30 days. There are other limiting features about the temporary standard which diminish its usefulness despite its many apparent advantages.

c. Indicate the Probable Tolerances.

The writer has for many years relieved himself of the defensive position many industrial engineers find themselves in by inserting after his standards what he considers to be the possible variation or tolerance limits, viz.: 100 units per hour ($\pm 10\%$). When the writer is pressed to figure a standard on a brand new job where not even the operators are fully trained (and hence his rating may be off by a wider margin than if experienced operators were used), he will indicate his judgment of the fluid condition of the job by inserting after his standard a tolerance limit of, say, $\pm 50\%$. Thus the responsibility for improving the job design or controlling the condition of the machine or materials is properly allocated—outside of the industrial engineering department and in the hands of the foreman, engineering, or purchasing.

In conclusion, it may be said that no job is ever fully developed to the point where a time study observer can set a permanent standard and expect it to be absolutely correct 10 years from now because of operator-inspired and other changes that creep into a job over a long period of time. So between



this one extreme of ideal tooling and the other extreme of new and untried tools and job designs is the area in which the prudent time study engineer operates. A good industrial engineer will hesitate to set a standard on a job the first day or even week it is running, especially if the job is to run for several months or years—unless he has standard data in his files that he can apply to the new job with confidence.

When is the job ready to be time studied? Common sense and time study experience will dictate the answer to this question under each set of conditions found in a work center at a particular time and under a particular set of operating conditions.

What are Proper Allowances?

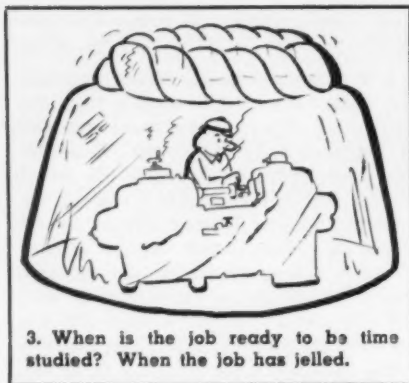
The subject of allowances has been under discussion in production and industrial engineering circles for many decades. Here, as elsewhere, there are very few simple rules to follow. There are today several types of allowances that are recognized by management. They are: (1) Personal; (2) fatigue; (3)

unavoidable delays; (4) preparation and clean-up; and (5) shrinkage or scrap.

1. **Personal.** Personal allowances (toilet, drink, etc.) vary widely from industry to industry and from one part of the country to the other. However, the most common figure is 5% which allows for a 12 minute break in the morning and a similar break in the afternoon. Some firms have a definite 10 minute rest period in the morning and a similar one in the afternoon with the operator privileged to take any extra time his health and feelings warrant.

The country-wide practice is to pay for this 24 minute personal requirement period which the writer believes should be borne by the operator. In other words, why should a company be forced to pay for a man quenching his thirst or taking care of his other personal needs? Of course, if a company did not pay for this non-productive personal time, the hourly rates or the piece rates would probably be higher so the take home pay would remain the same. Nevertheless, the writer does object to industry's continuing to pay for something it does not get.

2. **Fatigue.** Fatigue allowances go all over the map as one goes from one company or one system to another. There is a growing tendency to integrate the fatigue of the operator with the rating factor. Thus the industrial engineer when speed rating an operator will ask himself: "At what pace or speed can a normal operator continue working at this job all day long without undue or cumulative fatigue?" With, therefore, the greater liberalization in the rating factor for arduous jobs and because fatigue of all sorts is overcome, in part at least, by the 10 to 15 minute morning and afternoon breaks set aside for personal needs, there is a growing tendency to minimize or eliminate the fatigue factor altogether. This tendency has been accelerated in recent years by the interest many companies have



shown in operator comfort (e.g. by converting standing jobs to sitting jobs; by providing fans and other ventilation for welders and others working at hot and disagreeable jobs; by improved housekeeping and safety; by substituting truly functional factory chairs for stools and non-functional chairs.

Thus today it is very common practice to find "fatigue" lumped in with "personal"—"Personal and Fatigue Allowance,—%." Except under unusual conditions the writer assigns a 5% allowance in most of his time study work for "Personal and Fatigue." But, as indicated previously, he does liberalize his rating when observing operators working under severe bending and hot conditions realizing that no normal operator could continue at the speed being demonstrated (in most cases) over 95 per cent of the day.

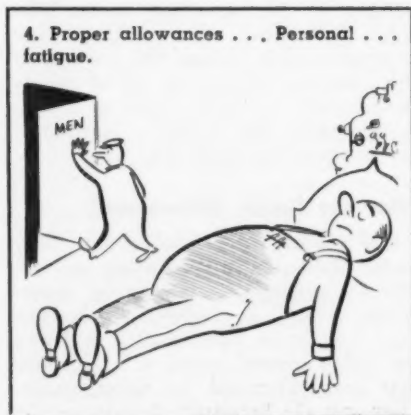
Fatigue allowance tables have been worked out by some consulting firms. Some of these even appear in the psychological and industrial engineering literature. But very few of them can be used without reference to the rating, personal allowances, and other local conditions under which the allowances were established.

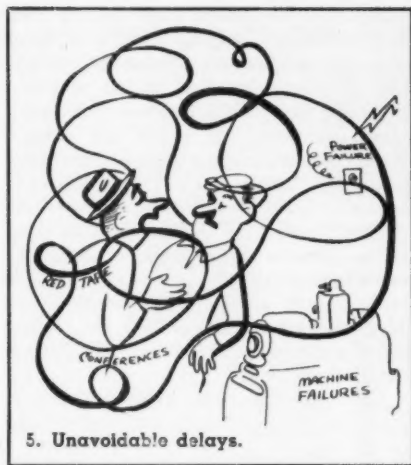
3. Unavoidable Delays. Unavoidable delays are handled in two ways: (a)

flat percentage; and (b) time recorded allowances.

The **flat percentage** figure is designed to recognize such contingencies as temporary machine and power failures, interruption in the flow of materials, short conferences with the foreman or other company personnel. To avoid bookkeeping all of these are averaged out over a day or a week and added together; if their total is around 48 minutes a day, then a flat 10% allowance is made for "Unavoidable Delays." Although this method of figuring allowances saves considerable record keeping it has the distinct disadvantage that it usually remains fixed over long periods of time during which the actual delays diminish or disappear; thus a company frequently finds itself with a 10, 15, or 20% loose rate structure caused by the desire years ago to "cut out red tape and record keeping."

The **time record** procedure for unavoidable delays is a system of time cards or allowance slips signed by the foreman. To minimize the record keeping in such a system, there frequently is the understanding that only delays in excess of, say, 3 minutes will be allowed or accredited to the operator.





If an operator is delayed either because of machine troubles or because of design or material conferences, he either rings out a card at the start of the delay and again at the end or he gets the foreman to sign a time credit slip.

But even this flexible and current allowance system has its disadvantages. Where unavoidable delay time is credited to the operator on the basis of previous average earnings, the operator usually is in no hurry to get things going again. (Who wouldn't rather take a long 30 minute rest, if a high incentive rate continues throughout this non-productive period?) Moreover, during severe labor shortages many foremen use liberal delay allowances as one means of increasing operator take-home pay, thus relieving tremendous local pressure for "more money."

As a practicing industrial engineer I strongly advocate the elimination of unavoidable delays as the best solution to the problem of delay allowances accounting!

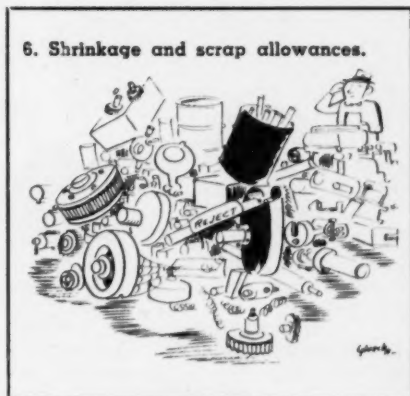
4. Preparation and Clean-Up. Frequently pressure valves must be opened and materials obtained and other items

taken care of at the beginning of a shift. Some of these, of course, are the responsibility of the foreman. But where the operator assumes the responsibility for them and where these items are not part of the time study standards or regular cycle time, then some allowance should be made for them. Typically, such preparation is a 1 to 3 minute task.

Likewise at the end of a shift certain items should be removed from the benches and tools returned to the tool crib. Usually these things take from 1 to 3 minutes.

Thus the writer usually allows a one per cent allowance for "Preparation and Clean Up." Where operators believe this is insufficient—and there are many exceptions to this one per cent rule—the writer recommends time studies be made of both the preparation and clean-up parts of the jobs in question.

What about the time taken by an operator to change his clothes or to wash up or take a shower? Should such personal toilet time be paid for by the company? The answer is Yes and No! The majority of American firms pay for the time workers change clothes or clean up at the end of a day's work. But should they pay for this personal



time? The writer views this in the same light he views the time taken by operators to get a drink and relieve themselves during the day (discussed elsewhere in this article).

This personal clean-up time allowance ranges from 5 to 15 minutes depending on the nature of the work and industry practices; the most common figure is 5 minutes. But even this 5 minute allowance frequently results in a 5 minute wait at the time clock before quitting time (and very few operators go home dirty!).

5. Shrinkage or Scrap Allowances. A few firms continue to pay for all pieces handled by an operator—good and bad pieces. This is done on the theory that

scrap may be caused more by material and machine defects than by poor operator fabrication. Moreover, counting all pieces handled by an operator during a day makes the record keeping much simpler. But there are certain disadvantages to such over-all counting. Certainly there is less control over operator fabrication when the operator is given credit for bad as well as good parts. Moreover, when operators are working on incentive there is a greater tendency to slam out production regardless of how it looks or fits, if the piece rates are based on total parts handled.

The practice most common today, therefore, is to give the operator credit

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only for good pieces turned out—pieces that meet quality inspection standards. Does this mean, then, that a piece worker is penalized when production falls below theoretical limits due to poor materials or faulty tools and other accessories? Certainly not. There are several ways this scrap or shrinkage problem might be handled with justice to everyone.

One way is to credit the operator with those bad pieces which are sub-standard because of conditions beyond his control; and to withhold credit on those scrap pieces which are within the control of the operator. Decisions on such matters are frequently left to the foreman.

Another common method (and the one the writer uses in much of his time study work) is to figure the percentage of non-controllable scrap compared with total pieces handled. This percentage figure is then added to other

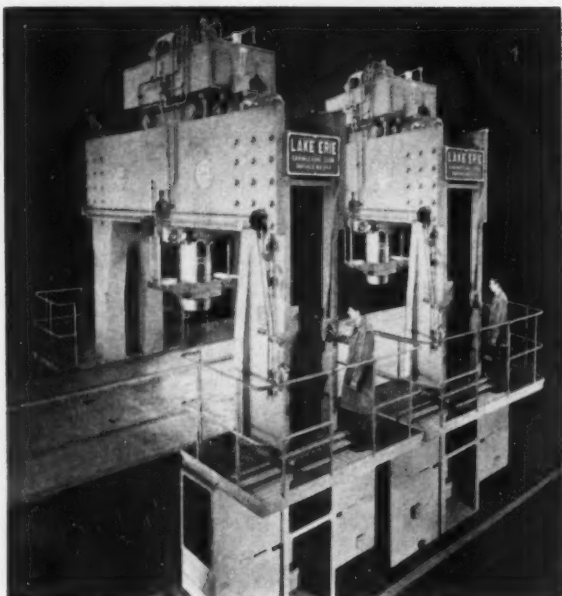
allowance percentages and deducted from a 60 minute hour to get a net working hour (this last is explained elsewhere).

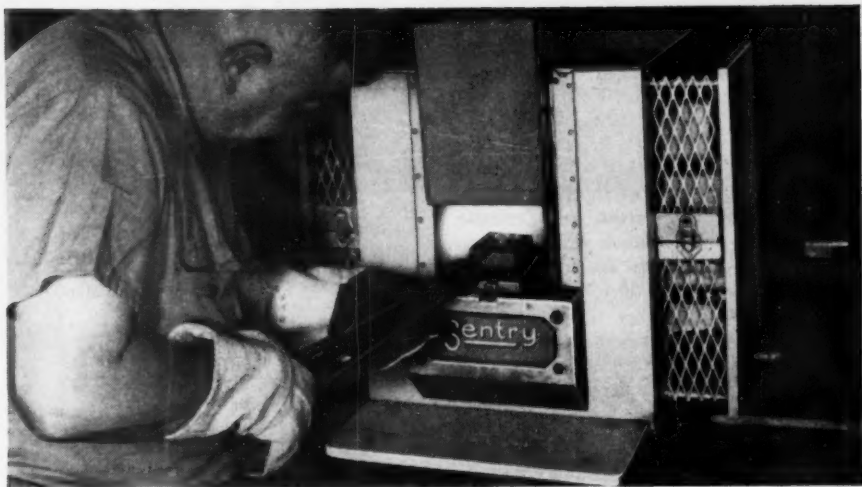
There is, however, a danger in this flat percentage method. The danger is present when scrap figures are high and then gradually diminish over a period of time—without anyone changing the percentage figure. So scrap or shrinkage allowances that exceed 3 per cent should be checked from time to time in order to avoid one of the causes of "incentive creepage."

Should Percentage Allowances be Added Onto Cycle Time?

The common practice in American industry today is to add all the percentage allowances together and increase the cycle time by this percentage increment. Technically (mathematically) this is in error. Space will not permit a full explanation of this in

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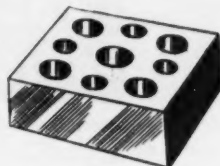




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this article (see pages 374 and 375 of MOTION AND TIME STUDY, third edition, by Dr. Ralph M. Barnes and the 1943 United Electrical Workers booklet, "Job Evaluation, Incentives, and Time Study"). It is sufficient at this point to say that the mathematically correct method of figuring allowances is to subtract from a 60 minute hour to get a net "work hour." Thus, if the total allowances are 6%, the net work hour becomes 56.4 minutes into

which the cycle time is divided.

The common mathematical error just referred to does not begin to manifest itself until allowances become large. For example the error when adding a 10% allowance onto a cycle time is only 1%; but when the allowances mount to 20%, the error is 4%. These common percentage adjustment errors tend to tighten standards resulting therefrom.

End of part 3

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UP TO 45,000 R.P.M. AND 1/4 H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn Tungsten Carbide Mills as well as all other rotary tools with shank diameters to 1/4". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.



SUPER 40 GRINDER MILLER

New



PRECISE SUPER 30
45,000 R.P.M.
and 1/4 H.P. in 35
oz. Draw collet.

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PRECISE PRODUCTS CORP. 1331 Clark St., Racine, Wis.

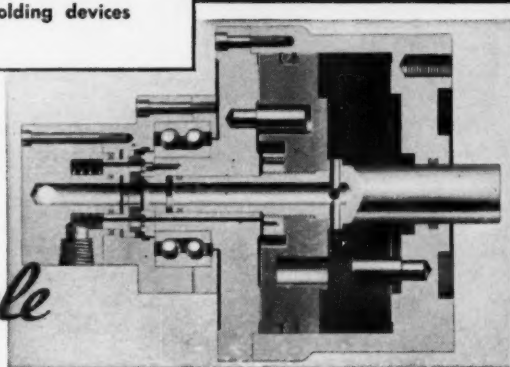
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CHUCK-ABILITY: The ability to **SPEED** your work
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... and **REDUCE** your costs ... through design
and selection of the right work-holding devices

Remember-
You can't machine it economically
unless you hold it right

an example



... is Cushman's comprehensive series of Aluminum Body Cylinders, guaranteed to operate up to 7000 r.p.m. without vibration and with low fly wheel effect. Available from 3¼" to 14" bore size with a stroke from 1" to 2" depending upon the cylinder size. Iron Body Cylinders, available from 8" to 20" bore size with a stroke from 1¼" to 2", are designed to operate efficiently at speeds specified for modern standard machine tools. Air Swivel Connections for both types of cylinders are made of aluminum with patented air seal designed to hold applied pressure without variation or leakage throughout a long service life. All cylinders are statically balanced and bench tested to eliminate vibration at rated speeds. While Cushman Rotating Air Cylinders have been designed for use with Cushman Air Operated Chucks, they will perform equally well with air chucks of other makes.

Find out what Chuck-Ability can do for you ... write Cushman for Catalog No. PO-64-1953 fully describing and illustrating Cushman Air Operated Chucks, Cylinders and Accessory Equipment ... or, should you have a special work-holding problem, consult the Cushman Engineering Department ...

THE CUSHMAN CHUCK COMPANY

806 Windsor Street

Hartford 2, Connecticut, U.S.A.



Manufacturers of

A WORLD STANDARD FOR PRECISION

Air Operated Chucks, Cylinders, and Accessory Equipment ... The Cushman Power Wrench ... Cushman Manually Operated Chucks and Face Plate Jaws.

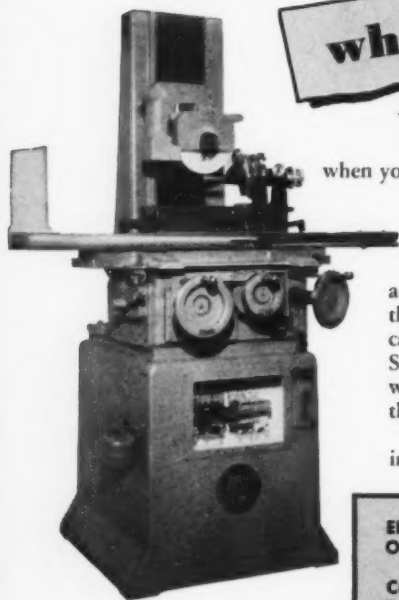
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**REID
GRINDERS**



Every move counts, with no tiresome reaching or bending, when you operate a Reid. All controls are right at finger-tip level . . . always under your complete control, reacting instantly, without backlash or wheel play.

Such dependable performance, the result of Reid's built-in accuracy, insures precision to meet the closest tolerances. When the shop order reads .0001", put the work on a Reid and you can be sure that the finished piece will pass inspection. Reid Surface Grinders are designed and precision-built by specialists who put the results of over a half-century of experience into their every detail.

Find out the full story on Reid Features for Better Grinding: request your copy of Bulletin 618-6.

Elevating hand wheel, graduated in .0005"
Optional: Vernier, graduated in .0001"
for elevating hand wheel
Cross feed hand wheel, graduated in .001"
Power feed (Model 618V), automatic adjustable cross
feed from .006" to .100" at each reverse of table.
Table speed, 12-35 feet per minute
Work capacity: 6" x 18" Table size: 51" x 8"
Standard wheel: 7" x 1/2" x 1 1/4"

Reid Brothers  **Company, Inc.**

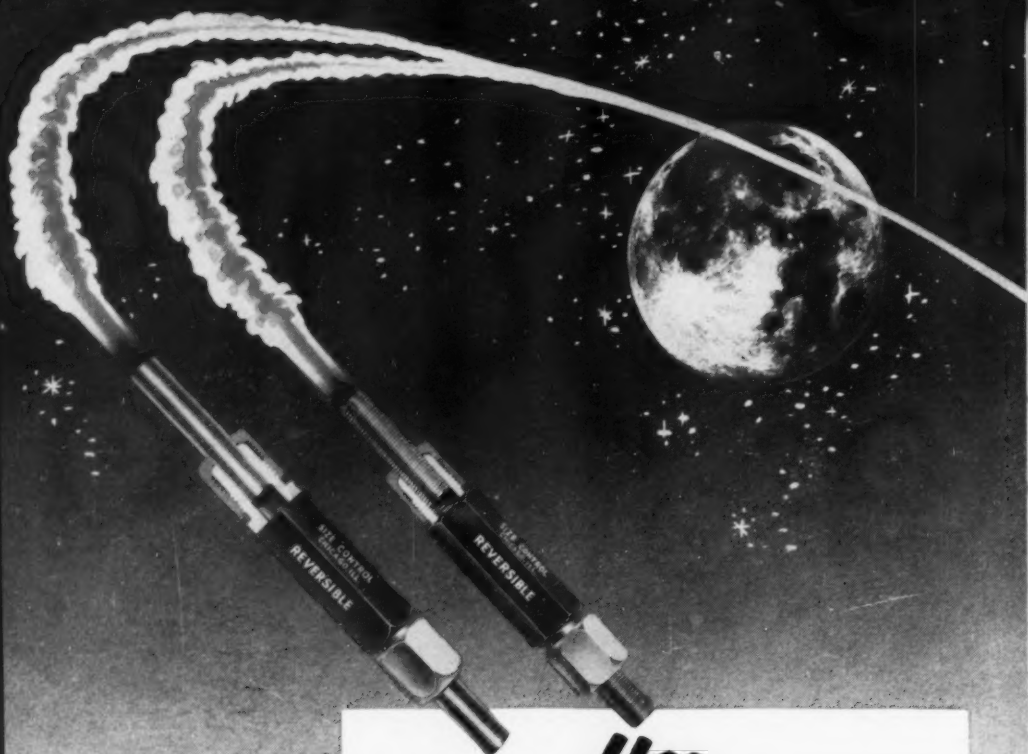
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Air Clamping Speeds Production of Jet Engine Parts

JET AIR Engineering Corporation, of San Diego, Calif., is primarily engaged in making "hot parts" for combustion sections of jet engines. Because of elongation after temperature rises which would melt the material if it were not for the free jet of air around the hot box, parts must be worked to extremely close tolerances. Usually, the tolerances are plus or minus 0.005 inch and frequently lower.

First experience of the company with compressed air, other than for such routine uses as cleaning off machinery and parts, was in connection with a drill press operation to thread a part. Output was around 350 parts a day when the method was to put the part in a chuck, locate, then pick up a chuck wrench and tighten, reversing the procedure when the part was tapped. Output was increased to 1000 parts a day by installing an air-operated collet, figure 1, on the machine. The operator simply drops the part in the collet, touches the foot pedal to close or open the collet thus eliminating the slow manual operation.

That experience caused the company to look around to see where else it might use compressed air to improve productivity. One decision was to install pneumatic bar feeds, figure 2, for turret lathes. When the operator opens the air collet, the bar feeds automatically into position for the next cut. Formerly, the operator moved from the machine to feed stock for the next cut, locked the collet and operated the machine.

The choice between a mechanical or air feed was an easy one for the small company. Initial cost was approximately half for the air feed, and maintenance cost was virtually eliminated because air-operated devices have few moving parts and are dependable in operation. The air feed saves the company about one minute per part.

A half-minute a part is saved by the company through use of an air vise in milling a spray bar housing. Output has been upped to 400 pieces a day.

Manually, the operation was to open the vise, reload, close vise with a hand crank, and cinch with hammer before



1. Simply by installing an air-operated collet on this drill press, the company was able to increase daily output from 350 parts to 1000 parts a day.

feeding. Now, the part is dropped into place, figure 3, and immediately tightened or removed by air pressure at the touch of a foot pedal.

Jet Air Engineering Corporation also has equipped its turret lathes with air chucks in order to get better output. These as well as the other air-operated devices also help attain the close precision work necessary because of their positive clamping action.

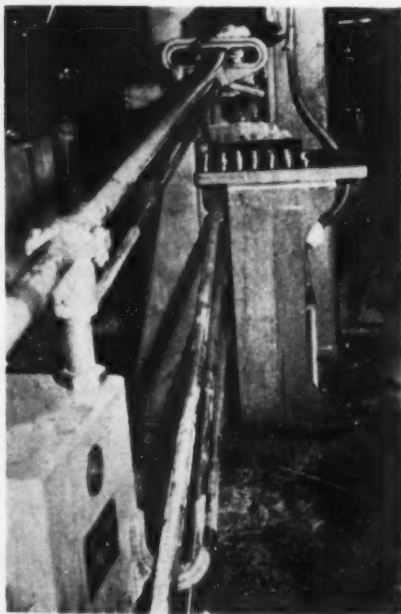
Making use of compressed air-operated devices is not a question of cost, rather it is one of savings. Thomas P.

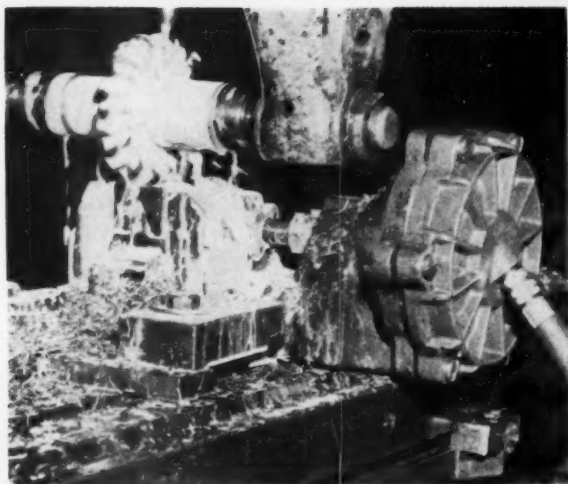
Faulconer, president and general manager of the company, said that most of the air-operated equipment installed had paid for itself in less than a month and from then on the benefits were net gain.

The young company's experience with compressed air also caused it to select pneumatic portable tools for high-speed grinding and de-burring. Air power assures the high speeds desired and it also is easy to regulate the speed as well as to control as desired.

The company is a supplier for such firms as Convair, AiResearch, Rohr Aircraft, Marquard Aero and others. It is developing other products—a power steering attachment for standard

2. Bar stock is fed pneumatically to turret lathes in order to save one minute a part over manual feed method.





3. The air vise shown here on this milling machine saves one-half minute a part over manual loading. Vise is operated by foot pedal.

automobiles for one—and, because of the versatility of compressed air in application, it sees many further uses for

this power when and if it goes into production on other than aircraft parts.

The End.



REHNBERG-JACOBSON : DRILL UNITS :

Self-contained Drill Units are fully-automatic and cam-operated for positive quill action. They come in five sizes with drill capacities ranging from 3/16" to 1-1/2" (in mild steel).

These units are all available for quick delivery. You can mount them on structures of your own to make practical and efficient production machine tools.

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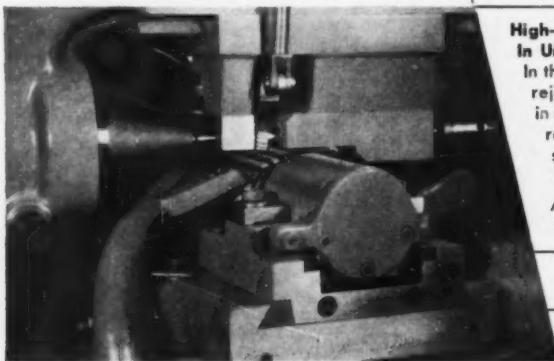
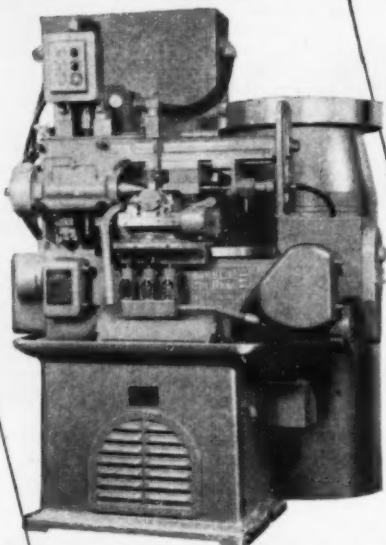


2135 KISHWAUKEE ST.
ROCKFORD, ILLINOIS

Fully Automatic GEAR HOBGING

offers new low costs on gears 16 pitch or finer

As more and more gear operations are modernized to place them on a competitive basis, automatic gear hobbing equipment becomes an essential approach in reducing gear costs. Since 1937 Barber-Colman engineers have been working closely with major gear producers in the application of automatic gear hobbing. At first, automatic hobbing applications were made in the watch gear and instrument fields. Later, machines were built for medium pitches in other fields, such as fishing reel gears. Now this latest Automatic No. 6-10 Hobbing Machine is designed specially for cutting automatic transmission and speedometer gears to meet the required rate of production on an automatic production line.



High-Production Plant Reports Savings in Unit-Costs with Fewer Gear Rejects

In this particular production plant, fewer gear rejects are occurring. An overall reduction in cost per gear has been effected through reduced man-hours and continuous high-speed output. One of a of battery machines performs as follows:

Automatic Cycle —	356 Hob RPM, 175 Hob SFM. .050" feed per rev., 60-second complete cycle time.
Transmission Gear —	16 teeth, 18° 30' helix angle 18 DP., SAE 1330, .937" OD. x ¾".
Class C Accurate Unground Hob	1 ½" dia. x 3" face x ¾" bore, 3 threads, unground, pre-shave.

Blanks are automatically loaded through a hopper-feed system and positively located and clamped hydraulically on a solid arbor in cutting position. The cycle sequence includes rapid traverse to the hobbing position, lowering of the work slide to cutting depth, hobbing the blank, raising the work slide, rapid traverse to the right, and unload. A new blank then is automatically presented for hobbing and the cycle repeated continuously until the machine is shut off. Machine features include automatic hob shifting for greater tool life and metered hydraulic pressure for positive arbor mounting and ejection. Rapid traverse is actuated electrically, and the work slide is hydraulically actuated.

BUILDERS OF PRECISION GEAR

**Adaptable to Wide Range of Long-Run,
High Speed Gear Production.**

This type of cycle arrangement is adaptable to many similar long-run gear cutting operations within the general range of 16 pitch and finer, depending upon the particular gear specifications. The cycle is arranged to suit the requirements of the job, and tooling, feed, speed and cycle-timing will depend upon the required production and gear specifications.

**Positive Control Over Gear Accuracy
Through Automatic Arbor Loading.**

Barber-Colman automatic hobbing supplies positive gear accuracy control through specially developed tooling which mechanically mounts blanks solidly upon the work arbor prior to cutting. This arrangement eliminates chances for looseness, runout or vibration likely to occur in other types of mounting. Work arbors are designed for positive pick-up and location of the blank.

Cycle Fully Protected by Automatic Stops.

A combination of electric limit switches, program motor and mechanical movements governs the cycle. Faulty blanks are automatically rejected if presented for hobbing, and the machine is under complete control at all times.

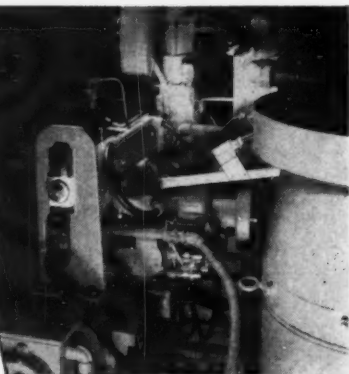


Rear View Showing Automatic Loader
and Electrical Panel

First Automatic
Cycle
Hobbing
Machine
1936

First Fully
Automatic
Hobbing
Machine
1937

Automatic Hob
Shifting
for Increased
Tool Life
1944



Close-up of Automatic Loading

**Engineering Service Available
Without Obligation**

Check your high production gear operations to determine whether you are maintaining a competitive cost basis. Barber-Colman engineers will gladly consult with your gear production people to demonstrate the cost-saving benefits of automatic hobbing. Ask your Barber-Colman representative to arrange an appointment for you, or write directly to Automatic Hobbing Engineering. No obligation!

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H O B S A N D M A C H I N E S S I N C E 1 9 1 1

Turret Lathe Used For Toolroom Work

by **John L. Elliott**, Process Engineer
Tracer Control Co.
Hazel Park, Mich.

RECENTLY, when Die Industries, of Hazel Park, was building an injection mold for plastic ash trays, they found themselves unable to use the tracer controlled lathe slated for turning the contours of component cores and cavities because of a breakdown. To wait for the rather lengthy repair would have meant missing the delivery date scheduled for the mold.

A neighboring production shop, however, had some open time on a Bardons and Oliver No. 5 Turret Lathe. To solve their problem we took one of our old Tracer Control Duplimatic accessory units which was not in use, trucked it over to the neighbor's shop, and made a temporary and rather novel installation.

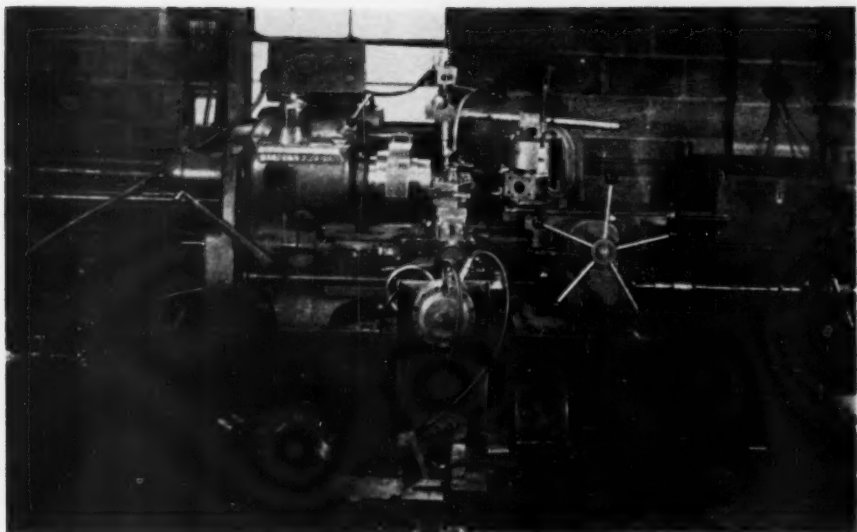
By C-clamping the lathe's three-jaw universal chuck to its turret, using parallel blocks, the chuck was utilized as a holder for the tracer mounting bracket. We then mounted a small, compound slide, rotating table on the cross-slide of the lathe. The existing tee-slots were used for mounting. The desired template was then mounted on the table providing a convenient method of aligning the template and ease of

subsequent precision adjustment of cutting depth.

The shear pin was removed from the feed rod coupling to leave it free to be driven by one of the hydraulic motors of the Duplimatic through a simple coupling on the opposite end of the feed rod. The handwheel was removed from the cross-slide screw and the second hydraulic motor was coupled to it instead. The stand for the cross-slide motor was wheeled to allow it to move in the same direction as the cross-slide's primary movement. It was also placed on a wooden riser to provide a common axis for both the hydraulic motor shaft and the cross-slide screw. Universal coupling of the drive shaft allowed some three to six inches lateral movement of the saddle.

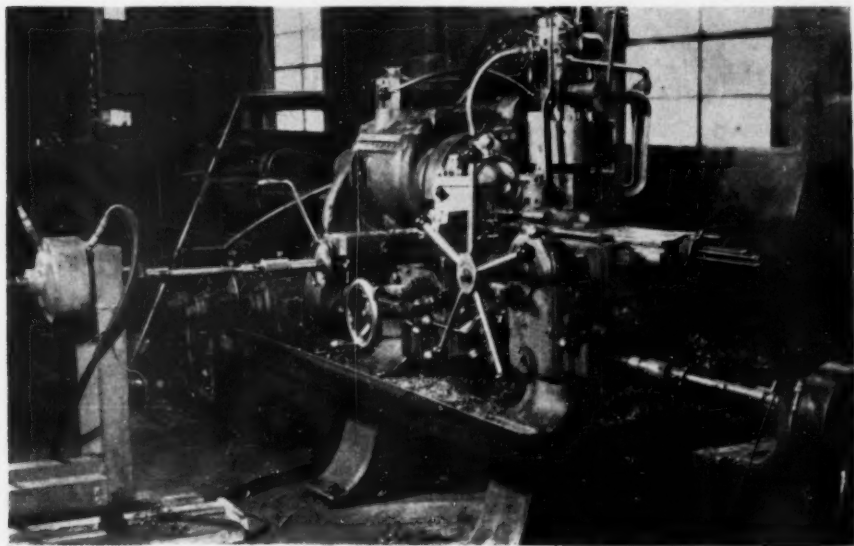
We then tapped the 220 volt line for power to the Duplimatic and went to work. Results were very good and especially appreciated because so little effort was required for the installation and tooling. Rough and finish operations were both tracer controlled, simplifying the actual machining to a considerable degree.

Both couplings consisted only of



Directional control panel rests on the headstock. The tracer, in its bracket, is mounted on the turret. By scaling turret slide movement, depth of roughing cuts were set.

One hydraulic drive motor is coupled to the feed rod for longitudinal feed in both directions. The other motor drives the cross slide. The Duplimatic electro-hydraulic power unit is adjacent to the chip pan at the head of the lathe.





A contour roughing cut in process. The tracer can be seen with stylus following the template which is mounted on the small compound. A solid carbide insert tool was used for cutting from extreme O.D. through the first 90° of contour, a boring tool for the bore and the contour leading into it.

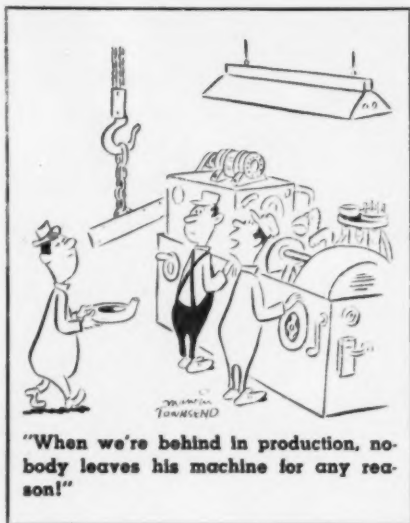
sleeves, with setscrews acting on split bushings. In this way, mutilation of the machine was avoided.

Conventional use of the feeds was not impaired, the only basic difference being that the feed rod drive was provided by one of the hydraulic motors rather than the drive motor of the lathe as would normally be the case.

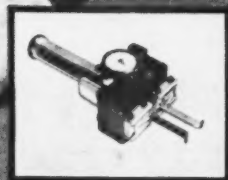
Rough cuts were set by merely scaling movement of the turret on its slide. Finish cuts were set by adjustment of the compound table which mounted the template.

This installation, though crude, served to allow the mold to be finished in time and the turret lathe was back in production within an hour of the final cut on the final mold component.

The End



BRYANT GROOVE GAGE

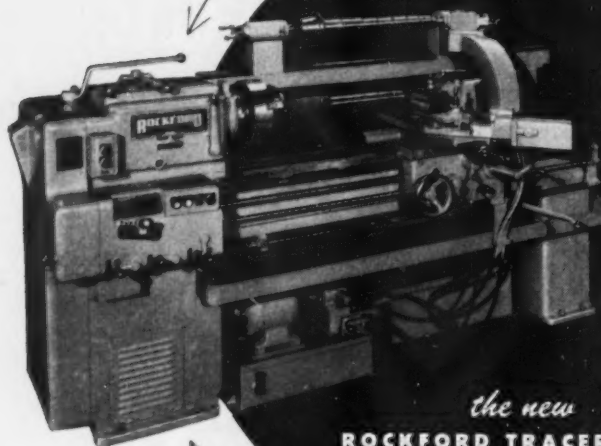


This Bryant gage checks the diameter and roundness of internal grooves up to 5". Four sets of segments are adjustable to cover the range of standard "O" ring grooves and four different sets are adjustable to cover the range of snap ring grooves. A movable segment actuates the dial indicator which gives direct reading of any variation from basic size. Bryant Chucking Grinder Co., Springfield, Vermont, U. S. A.

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ECONOMY-PRICED**

DOES IT AGAIN!



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in a tracer-lathe -
with
medium capital
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the new
ROCKFORD TRACER-LATHE
combines famous Rockford Features

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Be sure to see this new production tool in operation. Witness the unusual accuracy and speed with which it cuts. *Feel* the ruggedness and power built into the Kopy Kat with the extremely sensitive feather-touch of the servo-mechanism control. Yet the cutting tool works with 400 lbs. unit pressure for positive finish and accuracy.

See your Rockford Machine Tool Co. representative today and have him arrange an appointment for you to see the new Rockford Tracer Lathe in action.

Unusual Tracer Sensitivity and Accuracy

Overhead Tracer Control Uses Either Production Sample or Flat Master

Self-contained, Easily Accessible Hydraulic Unit

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Four Position Turret Tool Post on Compound

ROCKFORD ECONOMY LATHES

6', 8', 10', 12' BEDS

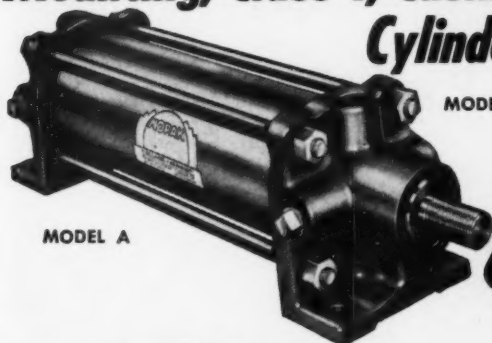
18" Swing

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NOPAK Shelf-Stock Service — based on these 2 Standard Mounting, Class 1, Cushioned Cylinders



MODEL A

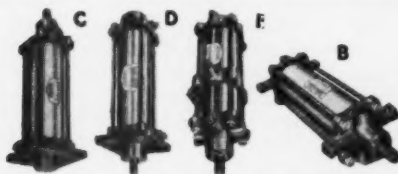
MODEL E



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year**

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STOCK STROKE LENGTHS — Double Acting Cylinders									
Cyl. Dia. Bore	1"	2"	3"	4"	6"	8"	10"	12"	15"
1½"	24.16	25.72	26.08	26.44	27.16	27.88	28.60	29.32	30.40
2"	26.24	27.88	28.32	28.76	29.64	30.52	31.40	32.28	33.60
2½"	32.36	34.12	34.68	35.24	36.36	37.48	38.60	39.72	41.40
3"	35.04	37.28	37.92	38.56	39.84	41.12	42.40	43.68	45.60
4"	40.84	43.68	44.52	45.36	47.04	48.72	50.40	52.08	54.60
4½"	48.96	51.92	52.88	53.84	55.76	57.68	59.60	61.52	64.40
6"	66.60	70.80	72.20	73.60	76.40	79.20	82.00	84.80	89.00
8"	126.80	129.20	131.60	136.40	141.20	146.00	150.80	158.00	



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DESIGNED for AIR and HYDRAULIC SERVICE

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- Basic mountings "A" or "E" convertible to "B", "C", "D" or "F", (see below) by changing cylinder heads. Add 10% to above prices, (no extra charge 8" bore).
 - Piston Rods NF male thread.
 - Cushioning can be eliminated on rod, blank or both ends by removing spring and ball-check.
- NOPAK 4-Way Valves, hand, foot, solenoid, or pilot operated, to activate all cylinders, also in Shelf-stock.

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Geneva Feeds for Punch Presses

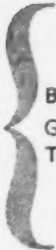
SEVERAL months ago Gaylord Container Corp. approached engineers of Geneva Machine & Tool Corp. with the problem of feeding seven tons of steel material through a punch press at $1\frac{1}{4}$ " stroke. Since this was a large feed, a suitable feeding mechanism could not be obtained on a press with this stroke.

However, Geneva engineers studied every feeding mechanism known to them and found no feeding device could accelerate or de-accelerate as well as the Geneva Drive. After considerable research, the feeding mechanism in the accompanying pictures was designed for the making of steel straps for tomato cartons. This punch press will make any size length strap required.

This Geneva feeding mechanism works in the following manner:

Parts No. 1 and 4 are constantly turning at 300 r.p.m. During the $\frac{3}{4}$ revolution of parts No. 1 & 5, No. 6, 7, 8, 9, 10, 10-A, 11, 11-A, & 13 are standing still. During the next $\frac{1}{4}$ revolution of No. 5, No. 6, 7, & 8 index $\frac{1}{4}$ revolution. Since No. 8 contains 64 teeth, and $\frac{1}{4}$ of 64 is 16, parts No. 9, 10 & 11, each containing 16 teeth, index one full revolution.

Feeding of steel material through and between punches and dies is exceedingly smooth because of the Geneva



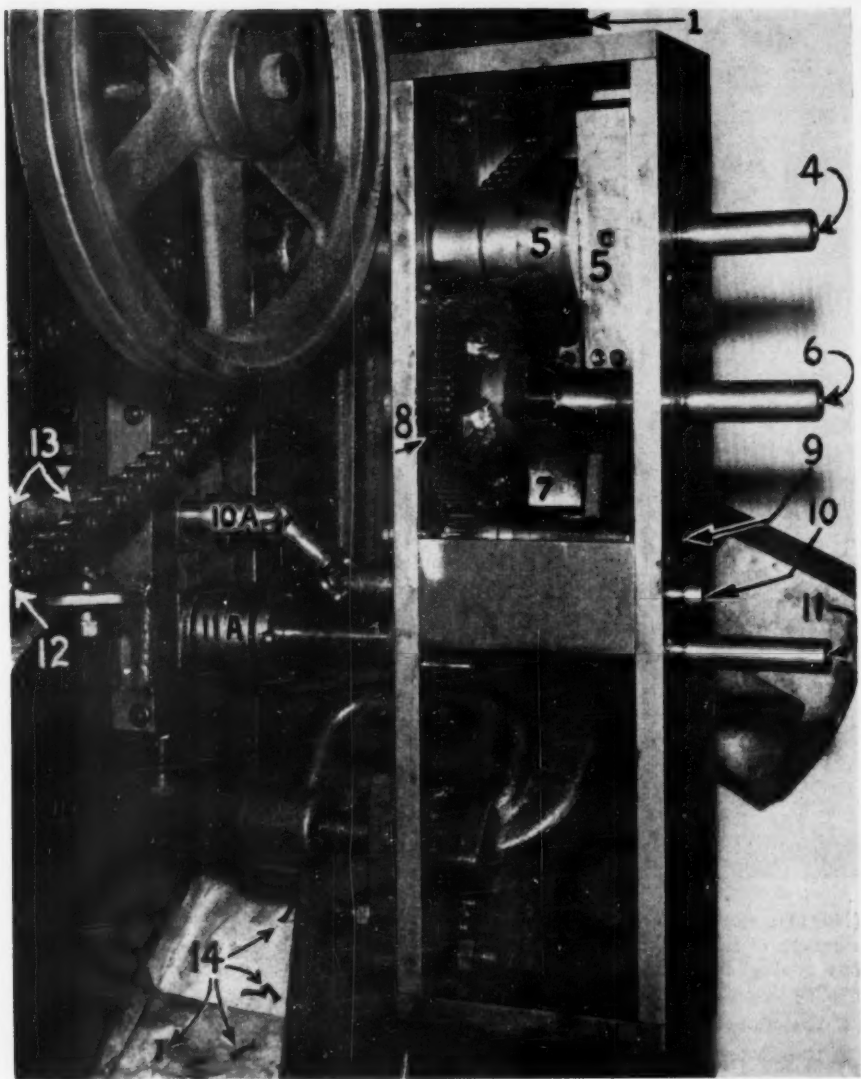
By **Joseph B. Midulla**, President,
Geneva Machine & Tool Corp.
Tampa, Florida

Drive acceleration and de-acceleration.

The length of the strap is controlled by making upper and lower feed rollers. Only No. 13 is shown. The start of the feeding can be adjusted at any given time. Feeding is accomplished during $\frac{1}{4}$ the full stroke of the press, regardless of the stroke of the press. This Geneva mechanism can be custom built to feed during $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$, or any fraction thereof, the stroke of the press. Advantage of this is that feed rollers can be held to a minimum diameter.

Such a device, often attached to a press either left or right and front or rear, merely necessitates the making of two feed rollers which can be supplied by us or the customer.

You may wonder why shafts for parts No. 6, 10 & 11 project out of the rectangular frame. This is because Geneva

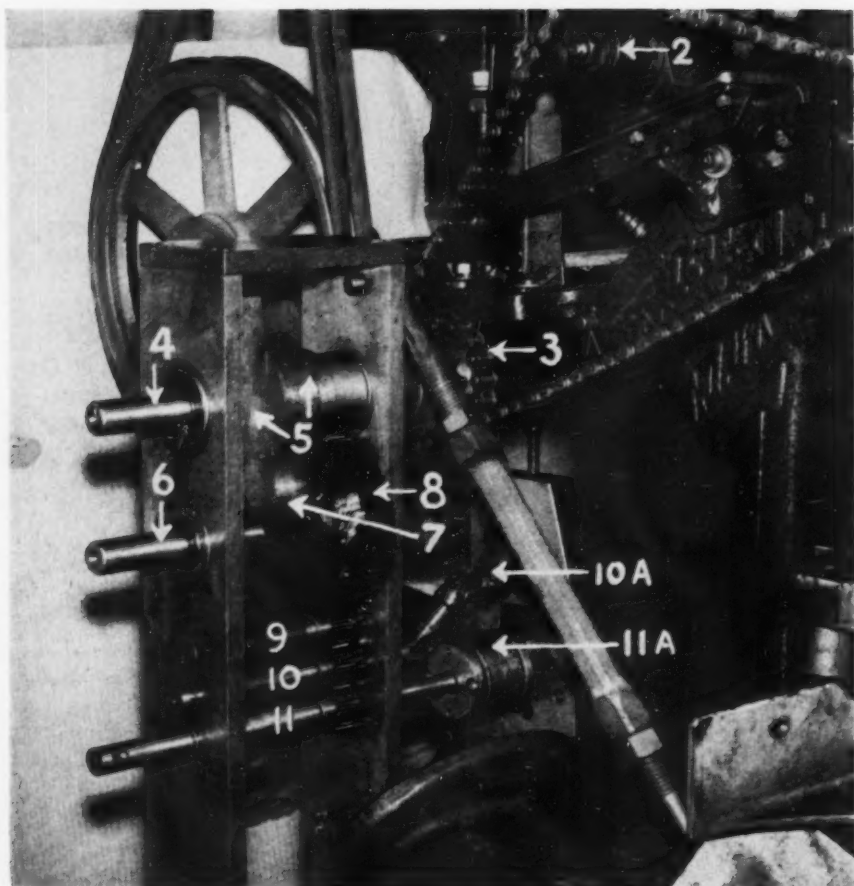


FOR NUMBERS IDENTIFYING THE PARTS PLEASE SEE NEXT PAGE.

engineers are now testing a very accurate "locking while in motion" mechanism.

This feeding mechanism holds a tol-

erance of plus or minus .005" and can easily be adjusted to hold a tolerance of plus or minus .001". However, we are also testing a new type of roll feed

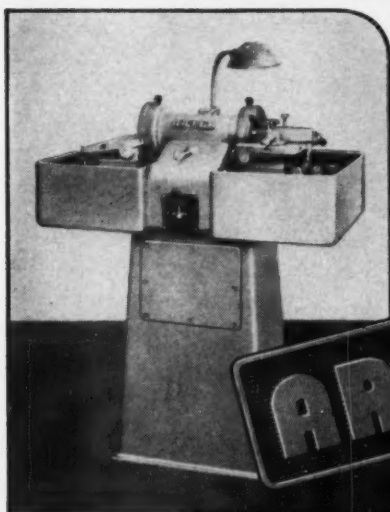


(No. 13), which eliminates any possible slippage of material fed. This includes any type of material.

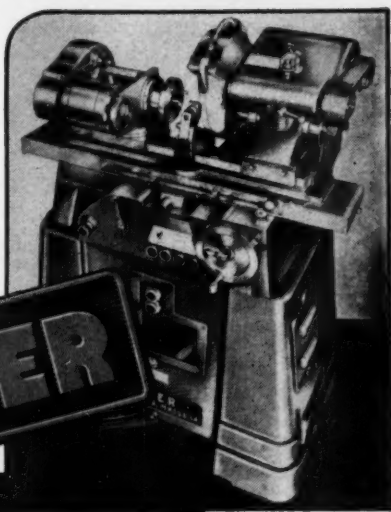
The reason for No. 10-A is to allow a constant tension on material fed through feed rollers.

1. 22-tooth sprocket keyed onto press shaft.
2. 22-tooth idler sprocket mounted on sealed ball bearings.
3. 22-tooth sprocket keyed to shaft.
4. Geneva Driver shaft with key way as shown in pictures No. 1 & 2.
5. Geneva Driver. This is similar to No. 4 P-3 Geneva, but is composed of steel arm 1" by 5" diameter and balanced to eliminate vibration at high speeds.
6. Geneva wheel shaft.

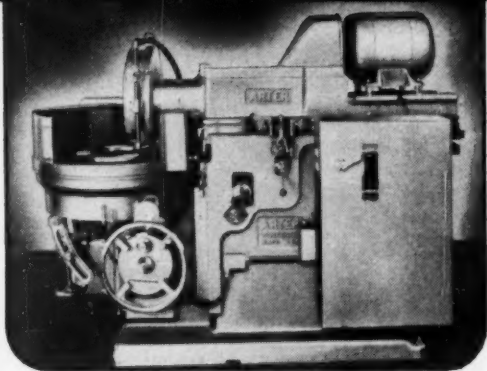
The Arter Family of Machines



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ROTARY SURFACE GRINDERS

Chuck Capacity 8" to 40"

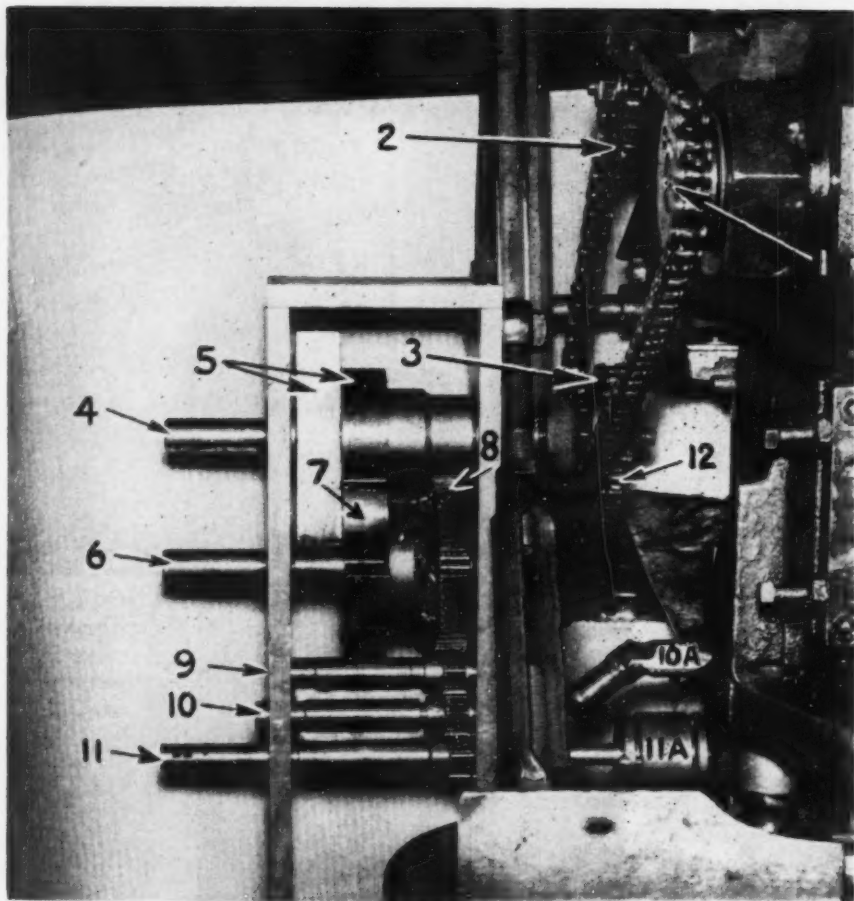
The Arter trademark on these machines is the sign of
ACCURACY • POWER • DEPENDABILITY.

Tell our engineers your grinding problems.

They'll find a way to lick them.

ARTER GRINDING MACHINE COMPANY
WORCESTER • MASSACHUSETTS

Agents in industrial centers of United States and Canada

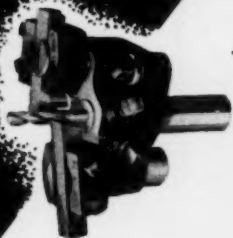


7. Geneva wheel No. 4 P-3, semi-steel material, $2\frac{1}{2}$ " diameter by 1" hub projection and keyed.
8. 64-tooth steel gear, 1" face, and welded to Geneva wheel No. 7.
9. 16-tooth idler shaft.
10. Upper roll feed 16-tooth shaft.
- 10-A. Series of two universal joints attached to shaft.
11. Lower roll feed 16-tooth shaft.
- 11-A. Safety clutch roll. World patents applied for and pending.
12. Chain attached to continuous steel feeding mechanism not shown in pictures.
13. Upper double feed rollers. Lower feed rollers attached to right of No. 11-A, pictures No. 1 & 2, and left of No. 11-A, picture No. 3, are not shown.
14. Scrap produced by punching of forward and rear parts of tomato straps.

The End

PRECISION TOOLS

R
RIGHT

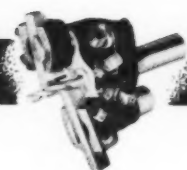


and

L
LEFT

CATALOG

R and L TOOLS
1828 BRISTOL STREET • PHILADELPHIA 40, PA.

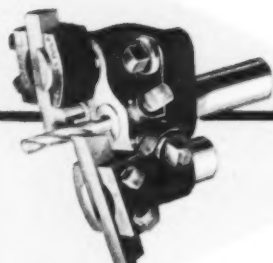


R and L TURNING TOOL

NEW COMBINATION TOOL

PATENT FEATURE

In addition to replacing an assortment of 14 tools, this New Combination Tool is the only Right and Left Hand Tool on the market. It can be changed from Right to Left in ten seconds, and vice versa.



CONSTRUCTED WITH BEST POSSIBLE CARE AND MADE OF FINEST STEEL

These tools are constructed of a very tough, heat treated alloy steel and guaranteed not to bend or give way in any manner.

All essential parts of the tool are ground to extreme accuracy to provide perfect alignment at any point of adjustment.

In addition to the utmost care used in manufacturing these tools — they have been tested on actual work for a period of two years before they were put on the market. Developed in a Screw Machine Shop for practical results.

Any of these tools can be furnished with different size shanks than those listed at small extra cost. This makes it possible for the user to have a number of different diameter shanks if necessary for the same tool, which enables the user to use the tools on different size machines.

ROUGH AND HEAVY CUTS AS WELL AS FINISHING CUTS

May be used for roughing and finishing cuts. Heavy cuts are possible with this tool because thrust is in direct line with the backrest at all times. Finish is excellent, free from chatter marks.

Changes In 10 SECONDS For RIGHT Or LEFT Hand Turning

SETTING AND ADJUSTING THE "R and L" TURNING TOOL

Setting the "R and L" Turning Tool is as easily accomplished as any other turning tool. However, due to its ability to handle a great variety of operations, new users of these tools may find the following suggestions helpful.

PLAIN TURNING with BACKREST

To set for plain turning, the tool bit is generally ground to a rake angle of about ten degrees. (This angle is sometimes varied to suit the machinability of the material used).

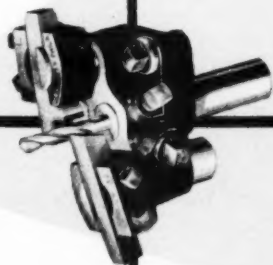
The tool is then placed in line with the center of the stock, and by loosening the clamping screw, the holder is swung around to approximately the required diameter. Finer adjustments can then be made with the two set screws which hold the tool bit, until exactly the required diameter is obtained.

The backrest is then brought into position and by loosening the clamping screw, and the two set screws, it is adjusted so that BOTH faces of the backrest rest LIGHTLY on the surface of the work just turned. Care must be taken that the backrest is not set ahead of the cutting tool. About $1/64$ " to $1/32$ " behind the cutting edge of the tool is usually right for most jobs.

Care should be taken to get a smooth even cut before adjusting the backrest, since the backrest will not produce a smooth finish on a surface that is not properly turned.

On jobs requiring a radius instead of a sharp corner, it is necessary to set the backrest back far enough so that it rests on the straight part of the work instead of on the radius.

On long, slender work, where there is a tendency of the stock to spring away the tool while setting for the required size, it is advisable to feed only a short length, and set the tool as outlined above.



PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

A NECESSITY IN THE MODERN MACHINE SHOP

BALANCED TURNING TOOL

By replacing the burnishers with extra tool holder (Part No. 3, furnished with each tool, it is readily converted into a balanced turning tool with two cutting edges.

Used mostly for roughing cuts, where there is a desire to remove metal quickly, the cut is divided between two tools.

The adjustment lengthwise permits two diameters to be turned to any length within its capacity.

ONE TOOL REPLACES THE ENTIRE ASSORTMENT OF FOURTEEN TOOLS LISTED BELOW

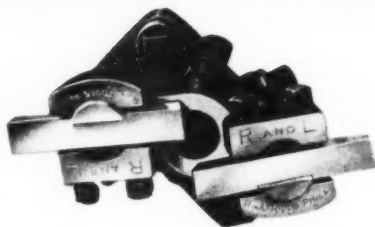
Roller Box Tool	\$70.50
Centering and Facing Tool	20.50
Knee Tool	34.25
Pointing Tool	33.25
Back Rest	24.50
Floating Drill Holder	11.50
Balancing Turning Tool	44.00

\$238.50

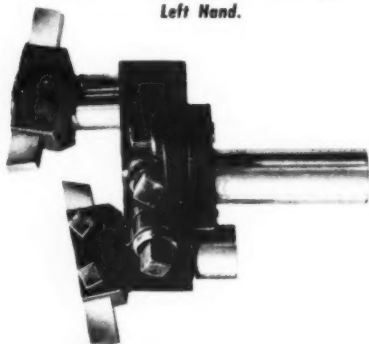
Same for left hand \$238.50

\$477.00

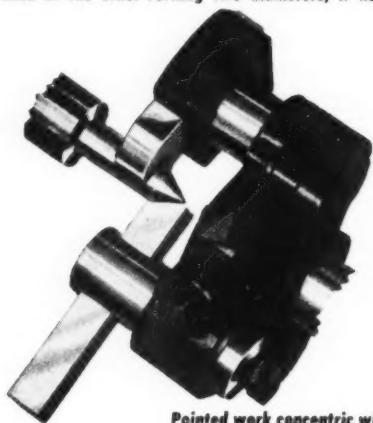
One R and L Tool of a similar size (No. 1—\$87.50) will take the place of above assortment of regular tools costing more than five times as much.



Used as a Balanced Turning Tool either Right Hand or Left Hand.



Used as a balanced turning tool with one cutter set in advance of the other—Turning two diameters, if needed.



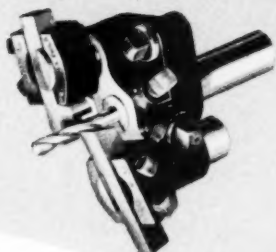
Pointed work concentric with turned diameter.

SIZES AND SPECIFICATIONS

STANDARD TOOL BITS

Uses tool bits of standard size—
no special shapes to grind or buy.

No. 00 — 5/16" Square	.....\$ .35 each
No. 1 — 3/8" Square	..... .60 each
No. 2 — 7/16" Square	..... .90 each
No. 2A — 1/2" Square	..... 1.30 each
No. 3 — 5/8" Square	..... 3.00 each
Double Ended Wrench	.....\$ .65 each



PRICES, SIZES AND CAPACITIES OF R and L TURNING TOOLS

Size	Diam. of Shank	Length of Shank	Diam. that can be turned without drill	Diam. that can be turned with drill	Hole thru Shank	Price
No. 00	5/16"	1 1/2" long	0" to 1/8" diam. x 1 3/4" long	0" to 1/8" diam. x 1" long	5/16" diam. tapped 3/8"—20	\$ 73.50
No. 1	3/8"	2" long	0" to 1/2" diam. x 2 1/4" long	0" to 1/2" diam. x 1 1/4" long	3/8" diam. tapped 7/8"—20	\$ 87.50
No. 2	1"	2" long	0" to 3/4" diam. x 2 3/4" long	0" to 3/4" diam. x 1 3/4" long	1/2" diam. tapped 1 1/8"—20	\$ 112.50
*No. 2A	1"	3" long	3/8" to 1 3/8" diam. x 3 1/2" long	3/8" to 1 3/8" diam. x 2 1/4" long	1/2" diam. tapped 3/4"—20	\$ 127.50
*No. 3	1 1/2"	4" long	1/2" to 1 1/2" diam. x 4" long	1/2" to 1 1/2" diam. x 2 1/2" long	1 1/8" diam. tapped 1 1/8"—20	\$ 155.00

Above prices apply also if furnished with Roller Backrests

*On No. 2A and No. 3 sizes we can furnish at additional cost extra Carbide Backrest to enable the tool to turn down to 1/8" diameter. Price—No. 2A, \$16.75; No. 3, \$20.00.

PRICES ON PARTS R and L TURNING TOOLS

	No. 00	No. 1	No. 2	No. 2A	No. 3
1. Body	28.00	35.00	48.00	55.00	75.00
2. Shank	8.75	10.00	12.75	14.00	16.75
3. Angular Cutter Holder (2) ea.	8.50	9.75	12.50	13.75	16.50
4. Backrest Holders	8.50	9.75	12.50	13.75	16.50
5. Clamp Screw (4) ea.	.60	.65	.80	.80	.80
6. Drill Holder Screw (2) ea.	.35	.45	.60	.60	.60
7. Tool Adjust. Screw (6) ea.	.20	.20	.40	.40	.40
8. Cutting Tool (3) ea.	.35	.60	.90	1.30	3.00
9. Backrest	8.75	10.00	12.75	14.00	16.75
10. Racker Shoe (3) ea.	.90	1.00	1.20	1.35	1.55
11. Straight Cutter Holder	2.20	2.70	3.80	4.30	5.50
12. Shank Screw	.20	.30	.50	.50	.60
13. Set Screw for Straight Cutter Holders	.30	.35	.60	.60	.60
14. Binder Pins for Straight Cutter Holder	.35	.45	.60	.60	.60

Each tool consists of all the parts listed above with one extra part No. 3 and one wrench.

When ordering extra parts, specify size of tool and part number.

The length and diameter of shanks listed here are regular stock sizes. Ordinarily, we can substitute some other length and diameter of shank if there is not too great a difference. Where something decidedly different is required, there will be a slight extra charge.

Price of Cutting Tools with Carbonyl Tip:

5/16" Square	No. 00	\$ 6.25
3/8" Square	No. 1	7.00
7/16" Square	No. 2	8.00
1/2" Square	No. 2A	8.75
5/8" Square	No. 3	11.50

State if you want the tool for cutting brass or other materials—Bronze, Brass or Aluminum. Unless otherwise specified we aim to furnish Kennametal K-6 carbides.

PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

R and L ROLLER AND CARBIDE BACKRESTS



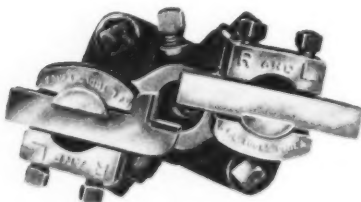
Approximate Minimum Diameters that can be turned when using Roller Backrest:

No. 00— $\frac{1}{4}$ "	No. 2A— $\frac{3}{16}$ "
No. 1— $\frac{1}{8}$ "	No. 3 — $\frac{3}{8}$ "
No. 2— $\frac{1}{16}$ "	

ROLLERS AND PINS

These Rollers and Pins are hardened, ground, and lapped in pairs, and are always shipped in that manner to the customer. Great care should be taken that they are kept that way in assembling. Price list below.

	No. 00	No. 1	No. 2	No. 2A	No. 3
Rollers and Pins	8.75	10.00	14.00	14.00	16.75
Roller Shanks	6.75	7.50	8.00	9.75	11.50
Roller Clamps	6.75	7.50	8.00	8.00	11.50
Clamp Screws	.60	.65	.80	.80	.80



Backrest and Cutting Tool Set for Right Hand Turning

R and L ROLLER BACKRESTS

We are now prepared to furnish all sizes of R and L Turning Tools with Roller Backrests that are INTER-CHANGEABLE with the Standard Carbide type of Backrest.

PRICES ON ROLLER BACKRESTS

No. 00\$18.75

No. 1 21.50

No. 2 27.00

No. 2A 30.00

No. 3 37.50

No extra charge if tool is ordered with rollers instead of Carbide Backrest.

The complete Carbide Backrest consists of the following assembly of parts as listed on page of this catalog.

- 1 No. 4 Backrest Holder
- 2 No. 7 Tool Adjusting Screws
- 1 No. 9 Backrest
- 1 No. 10 Rocker Shoe

The prices of these parts assembled are the same as the complete Roller Backrest.

CARBIDE BACKRESTS

The extremely hard surface of the Carbide backrests, or burnishers, makes it impossible to pick up the metal and mar the surface of the work with scratches or blisters.

The cutting tool can also be furnished with a Carbide Tip to take care of extremely difficult jobs.

This is particularly true of the tougher metals such as Nickel Alloys, Bronze, Nitralloy and Stainless Steel.

There are no Rollers or Roller Shafts to wear and cause misalignment of the rolls with the work.

Extremely fine adjustment is provided on both the cutting tool and the pressure of the burnishers.

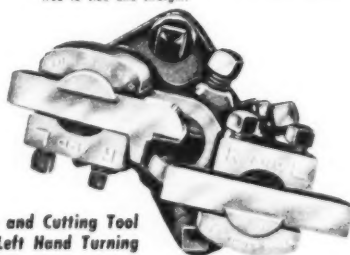
The method of mounting tool bits provides longer life, since the tool bits are ground only on the top side, or end.

Due to the shape of the tool less cross-slide clearance is required, creating a saving in time besides in many cases permitting work to be done with cross-slide tools while the piece is being drilled or turned.

When used as a Turning Tool the R and L "Combination Tool" produces a highly polished surface, true to size and straight.

NO

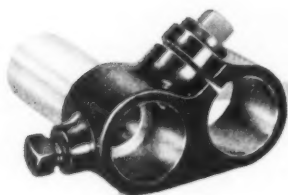
MISALIGNMENT . . .



Backrest and Cutting Tool Set for Left Hand Turning

R and L BACKREST HOLDER FOR TURRET

This holder can be fitted with either a Roller Backrest or a Carbide Backrest same as used on our R and L Turning Tools. If fitted with Angular Cutting Holder same as used on our Turning Tools it makes a substantial single point turning tool, or centering and facing tool.

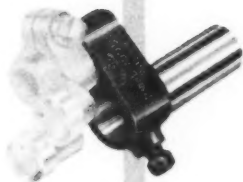


PRICES FOR HOLDER ONLY

as shown

No. 00 with $\frac{3}{8}$ " dia. shank	.....\$18.75 each
No. 1 with $\frac{7}{8}$ " dia. shank	..... 21.50 each
No. 2 with 1" dia. shank	..... 27.00 each
No. 3 with 1 $\frac{1}{2}$ " dia. shank	..... 37.50 each

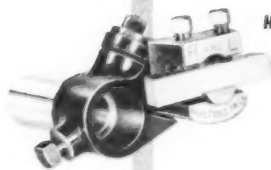
Larger Sizes Made to Order.



Holder used with Roller Backrest



Holder used with Carbide Backrest



Holder used with Angular Cutter Holder

The Complete Angular Cutter Holder consists of the following assembly of parts.

- (1) No. 3 Angular Cutter Holder
- (2) No. 7 Tool Adjust. Screw
- (1) No. 8 Cutting Tool
- (1) No. 10 Rocker Shoe

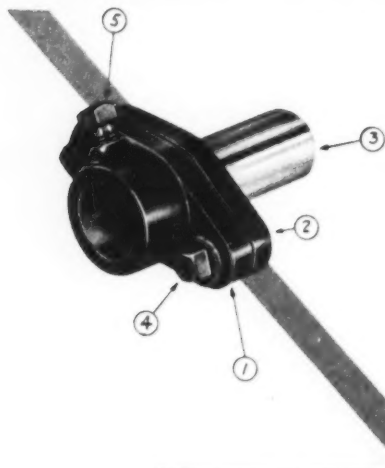
PRICES ON R and L ANGULAR CUTTER HOLDERS:

No. 00	.....\$10.00 ea.
No. 1	..... 11.75 ea.
No. 2	..... 15.00 ea.
No. 2A	..... 16.50 ea.
No. 3	..... 20.00 ea.

Larger Sizes Made to Order

PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

R and L FLOATING DRILL HOLDERS • REVOLVING STOCK STOPS



R and L FLOATING DRILL HOLDERS

For holding drills—Reamer and other tools

PARTS

	00	1	2
No. 1. body	\$7.50	\$8.50	\$9.50
No. 2. shank	4.50	5.00	5.50
No. 3. shank screw .....	.20	.30	.50
No. 4. clamp screw .....	.60	.65	.80
No. 5. drill holder screw .....	.35	.45	.45

PRICES FOR R and L FLOATING DRILL HOLDERS

No. 00— $\frac{1}{8}$ " dia. shank\$11.50 ea.

No. 1— $\frac{3}{4}$ " dia. shank 13.00 ea.

No. 2—1" dia. shank 14.75 ea.

Larger Sizes Made to Order

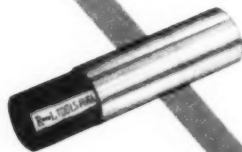
R and L REVOLVING STOCK STOPS

No. 00— $\frac{1}{8}$ " dia. x 3" long\$15.50 ea.

No. 1— $\frac{3}{4}$ " dia. x 4" long 16.75 ea.

No. 2—1" dia. x 5" long 18.50 ea.

Length of Shanks to suit customer's needs.

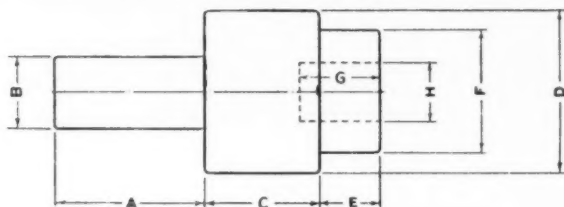




R and L TAP AND DIE HOLDERS



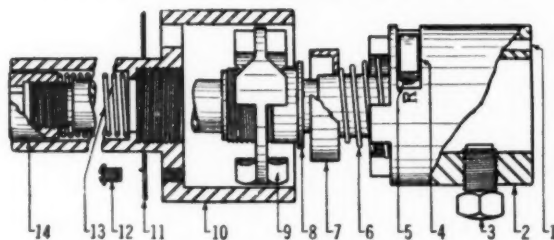
PRINCIPAL DIMENSIONS OF TAP AND DIE HOLDERS



No.	A	B	C	D	E	F	G	H
000	$1\frac{3}{16}$	$\frac{3}{8}$	$\frac{7}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{7}{16}$
00	$1\frac{1}{4}$	$\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
1	$1\frac{3}{4}$	$\frac{3}{8}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
2	2	1	$1\frac{1}{8}$	$2\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$	$1\frac{1}{2}$	1
3	$2\frac{9}{16}$	$1\frac{1}{4}$	2	$2\frac{3}{4}$	$\frac{3}{8}$	$2\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{1}{4}$
4	$3\frac{1}{16}$	$1\frac{1}{2}$	$2\frac{1}{8}$	3	$1\frac{1}{8}$	3	$1\frac{3}{4}$	$1\frac{1}{2}$

Dimensions A, B, G and H can be furnished to other dimensions than those shown, on special order, to suit customer's specifications. Prices on request.

PARTS OF R and L TAP AND DIE HOLDERS



- 1—Reverse Pawl Pin
- 2—Spindle
- 3—Set Screw
- 4—Reverse Pawl
- 5—Reverse Pawl Spring
- 6—Clutch Return Spring
- 7—Clutch Return Washer

- *8—Clutch Ring Retaining Nut
- 9—Clutch Ring
- 10—Body
- 11—Cover Plate
- 12—Cover Plate Screw
- 13—Shank Spring
- 14—Spindle Nut

*Part No. 8 can be furnished somewhat shorter than regular so as to enable you to cut extra short threads.

PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

NEW RELEASING MECHANISM

INSIDE CONSTRUCTION R AND L TAP AND DIE HOLDER

Figure 1.

Ready to start threading operation, clutch slightly engaged at C.

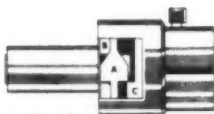


Fig. 1

Figure 2.

Instantly engaged to full contact between A and C as soon as tap or die engages work.

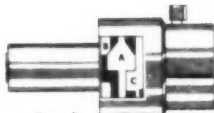


Fig. 2

Figure 3.

Fully released showing ample clearance between contact points of clutch preventing re-engagement or hammering of clutch points in case turret advances slightly after clutch releases.

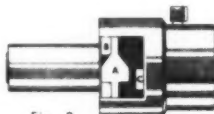


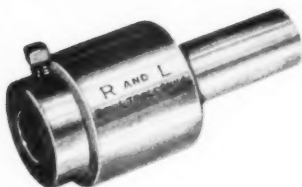
Fig. 3

The R and L Tap and Die Holder HAS AN ENTIRELY NEW RELEASING MECHANISM and can readily be changed for Left Hand Threading: NO SPRING PLUNGERS TO WEAR OR BREAK. NO SMALL SCREWS TO WORK LOOSE.

By substituting a shorter clutch ring retaining nut this tool can be readily changed for cutting extra short threads.



R and L TAP AND DIE HOLDERS



RELEASING TYPE

Patented

PRICES

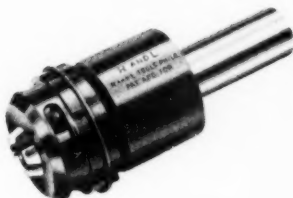
No. 000 Dia. of shank	5/8"	\$27.00
No. 00 Dia. of shank	3/4"	27.00
No. 1 Dia. of shank	1"	33.50
No. 2 Dia. of shank	1 1/4"	47.00
No. 3 Dia. of shank	1 3/4"	100.00
No. 4 Dia. of shank	2"	127.50

NON-RELEASING TYPE

PRICES

No. 000 Dia. of shank	5/8"	\$13.50
No. 00 Dia. of shank	3/4"	13.50
No. 1 Dia. of shank	1"	16.75
No. 2 Dia. of shank	1 1/4"	23.50
No. 3 Dia. of shank	1 3/4"	53.50
No. 4 Dia. of shank	2"	67.00

In ordering the above Tap and Die Holders, please mention if for regular or short thread. We have a few customers who want socket head screws with U.S. Standard thread. When ordering please specify which thread is required. Special shanks are available of slight extra cost.



RELEASING DIE HOLDERS FOR ACORN DIES

These holders have the well known releasing clutch construction same as used on our releasing Tap Holder.

A keyed washer is used between the adjusting cap and the lock nut. Tightening the lock nut will not change the adjustment of die.

Our new—No. 000 size is extremely sensitive for small size dies when used on High Speed machines.

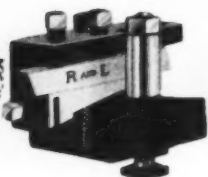
PRICES

	Threading Capacity Inches	Dia. of Shank Inches	No. of Die Needed	Price
No. 000	1/8 to 7/16	5/8	1	\$ 40.00
No. 00	1/4 to 3/8	3/4	2	40.00
No. 1	1/2 to 7/8	1	2	47.00
No. 2	3/4 to 1 1/4	1 1/4	3	60.00
No. 3	1 1/4 to 1 3/4	1 3/4	4	120.00
No. 4	1 3/4 to 2 1/4	2 1/4	5	167.00

A substantial spanner wrench is furnished with each holder.

Average maximum threading capacity as listed will vary depending on the nature of the material being threaded and whether a fine, coarse, or medium thread is being cut.

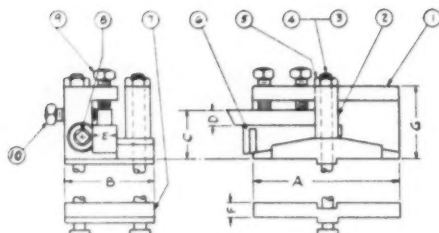
PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG



R and L UNIVERSAL TOOL POST

PATENTED

PRICES ON PARTS



Part No.	No. 00	No. 1	No. 2
1 Body	\$23.50	\$33.50	\$40.00
2 Bushing .....	.45	.50	.60
3 2 Long Bolts (2)	1.30	1.95	2.25
4 2 Short Bolts (2) .....	.80	1.75	2.00
5 4 Nuts (4) .....	.20	.30	.35
6 Taper Wedge	4.00	4.35	4.75
7 Raising Block	4.75	5.35	6.75
8 Adjusting Screws ..	.70	.95	1.25
9 2 Set Screws .....	.35	.45	.60
10 2 Set Screws .....	.35	.45	.60

PRICES UNIVERSAL TOOL POSTS

No. 00	\$34.00
No. 1	47.50
No. 2	60.00

The R and L Universal Tool Post for holding square or flat tools provides means for adjusting the tool IN ALL DIRECTIONS.

It can be used on front or back cross-slide with spindle running either forward or backward.

The tool can be set up close to the chuck.

R and L CUT OFF BLADE HOLDERS

This tool is designed to fit in our R and L Universal Tool Post for holding Bevelled Cut Off Blades. It enables the operator to remove the entire holder from the Tool Post for regrinding the Cut Off Blade and put it back with the cutting point projecting the same as the original setting, and then place the holder in the Universal Tool Post ready for work without any further adjustment.

These holders can be set to cut off work as close to chuck as desired.

One holder can be used on either front or back cross slide with spindle running forward. Another one is required if spindle is to run backward.

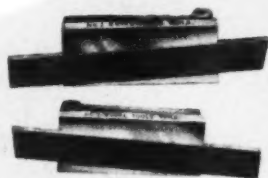
PRICES

No. 00 Size for Brown and Sharpe No. 00 or 00G \$20.00 each	
No. 1 Size for Brown and Sharpe No. 0 or 0G 27.00 each	
No. 2 Size for Brown and Sharpe No. 2 or 2G 33.50 each	

HIGH SPEED CUT OFF BLADES	
No. 00— $\frac{1}{8}$ " wide	\$2.25 each
No. 1— $\frac{3}{16}$ " wide	2.50 each
No. 2— $\frac{1}{4}$ " wide	3.00 each
$\frac{1}{4}$ " wide for Brown and Sharpe Vertical Slide	3.20 each
Other Sizes to Order	

STATE THICKNESS DESIRED

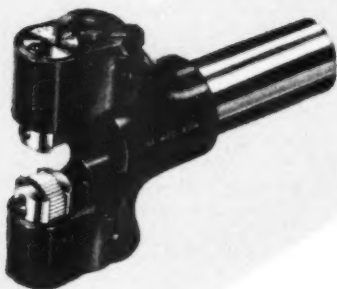
Solid Tungsten Carbide Blades can be furnished—Price given on request.



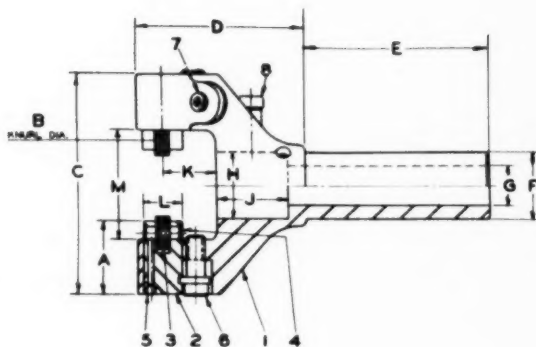


R and L KNURLING TOOL

The convenient position of the set screw enables you to get to work faster by cutting down your setup time. The set screw locks the knurl pin securely . . . also allows knurl changing without removing the holder from the turret. The R and L KNURLING TOOL is available in a complete range of sizes. Knurls can be adjusted to any angle, producing either straight or diamond patterned knurling.



New streamlined design has half the weight of existing tools of comparable size, affords better grip and control of knurls. Available in a complete range of sizes. Only one Hex Wrench needed for all adjustments.



PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

SPECIFICATIONS AND PRICES

R and L KNURL HOLDERS

No.	Dia. of Shank Inches	Knurling Length Inches	Capacity Diameter Inches	Price
00	$\frac{3}{8}$	1	$\frac{1}{8}$ to $\frac{3}{8}$	\$47.50
1	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{1}{8}$ to $\frac{3}{8}$	50.00
2	1	$1\frac{3}{4}$	$\frac{1}{8}$ to $\frac{3}{8}$	53.50
3	1 or $1\frac{1}{4}$	$1\frac{3}{4}$	$\frac{1}{8}$ to $1\frac{3}{8}$	67.00

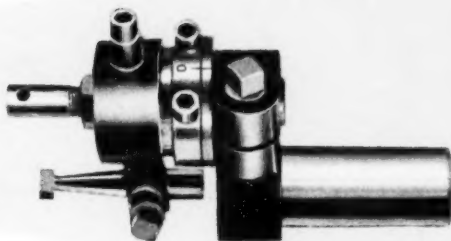
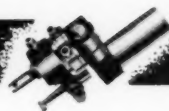
PRICES ON PARTS R and L KNURLING TOOL

Part No.	Name of Part	No. 00	No. 1	No. 2	No. 3
1	Body	\$37.50	\$40.00	\$45.00	\$50.00
2	Barrels (2) ea.	5.50	5.50	5.50	5.50
3	Knurls (2) ea.	3.50	3.50	3.50	3.50
4	Knurl Pins (2) ea.	.40	.40	.40	.40
5	Barrel Screws (2) ea.	.30	.30	.30	.30
6	Adjusting Screws (2) ea.	.90	1.20	1.20	1.20
7	Clamp Screws (2) ea.	1.15	1.15	1.15	1.15
8	Drill Holder Screw	.60	.60	.60	.60

Tool No.	Dia. Will Knurl	A	B	C	D	E	F	G	H	J	K	L	M
00	$\frac{1}{8}$ to $\frac{3}{8}$	Std. $\frac{7}{8}$	$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$
1	$\frac{1}{8}$ to $\frac{3}{8}$	Std. $1\frac{1}{8}$	$\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	1
2	$\frac{1}{8}$ to $\frac{3}{8}$ $\frac{1}{2}$ to $1\frac{1}{4}$	Std. $1\frac{1}{8}$ $1\frac{1}{8}$	$\frac{3}{4}$	$3\frac{5}{8}$	$2\frac{1}{2}$	$2\frac{3}{8}$	1	$\frac{3}{8}$	1	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$1\frac{3}{4}$
3	$\frac{1}{8}$ to $1\frac{3}{8}$ $\frac{1}{4}$ to $1\frac{1}{2}$	Std. $1\frac{1}{8}$ $1\frac{1}{8}$	$\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	2

Dimension F can be furnished in other diameters if required.

R and L RECESSING TOOL

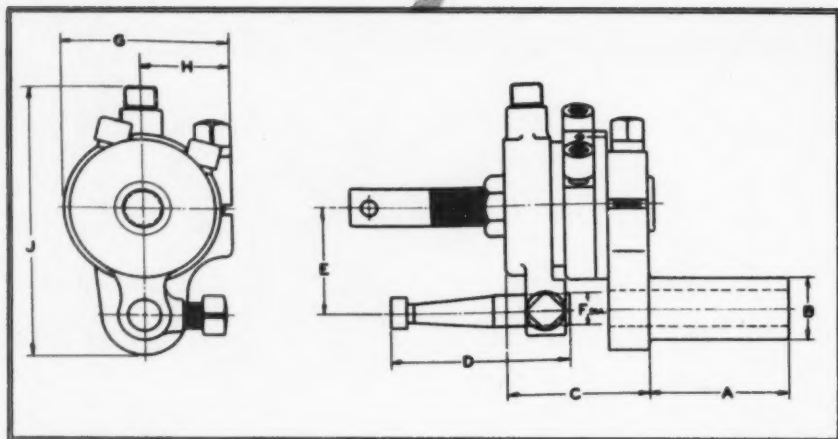


This is an entirely new design. Can be adjusted to operate on any internal diameter within capacity of the machine. It can also be adjusted to operate on outside diameters for cutting grooves or similar operations such as chamfering or cutting clearance at end of threads.

This tool is also easily adjusted to operate with spindle running either right or left handed with pressure on cutter downward giving steadier action on cutting tool.

PLEASE SEND FOR COMPLETE R and L TOOLS CATALOG

RECESSING TOOL SPECIFICATIONS AND PRICES



Two adjusting screws shown provide for fine adjustment for depth or diameter of recess.

Approximate maximum depth of recess $\frac{3}{32}$ " to $\frac{1}{8}$ ".

Approximately 1 to 1 ratio in relation to rise on cam.

PRICES AND APPROXIMATE DIMENSIONS

Size	A	B	C	D	E	F	G	H	J	PRICES
No. 00	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{1}{8}$	2	$1\frac{1}{8}$	$\frac{1}{8}$	$1\frac{1}{8}$	$\frac{3}{8}$	$2\frac{1}{8}$	\$73.50
No. 1	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{1}{8}$	2	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{1}{8}$	$\frac{1}{2}$	$3\frac{1}{8}$	\$87.50
No. 2	2	1	$2\frac{1}{8}$	2	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{1}{8}$	$\frac{3}{8}$	$3\frac{1}{8}$	\$100.00

LARGER SIZES MADE TO ORDER

Weights of Sheet Copper

Per Square Foot, and Thickness per Stubs' Gauge

Rolled Copper has specific gravity of 8.90. One cubic foot weighs 558.125 lbs.

Stubs' Wire Gauge	Thickness in Decimal Parts of 1-inch	Weight per Square Foot in Ounces	Weight of Sheet 14x48 Inches in Pounds	Weight of Sheet 24x48 Inches in Pounds	Weight of Sheet 30x60 Inches in Pounds	Weight of Sheet 36x72 Inches in Pounds	Weight of Sheet 48x72 Inches in Pounds
35	.00537	4	1.16	2	3.12	4.50	6
33	.00806	6	1.75	3	4.68	6.75	9
31	.0107	8	2.33	4	6.25	9	12
28	.0134	10	2.91	5	7.81	11.25	15
27	.0161	12	3.50	6	9.37	13.50	18
26	.0188	14	4.08	7	10.93	15.75	21
25	.0215	16	4.66	8	12.50	18	24
24	.0242	18	5.25	9	14.06	20.25	27
22	.0269	20	5.83	10	15.62	22.50	30
21	.0322	24	7	12	18.75	27	36
19	.0430	32	9.33	16	25	36	48
18	.0538	40	11.66	20	31.25	45	60
16	.0645	48	14	24	37.50	54	72
15	.0754	56	16.33	28	43.75	63	84
14	.0860	64	18.66	32	50	72	96
13	.095	70	.....	35	55	79	105
12	.109	81	.....	40½	63	91	122
11	.120	89	.....	44½	70	100	134
10	.134	100	.....	50	78	112	150
9	.148	110	.....	55	86	124	165
8	.165	123	.....	61	96	138	184
7	.180	134	.....	67	105	151	201
6	.203	151	.....	75½	118	170	227
5	.220	164	.....	82	128	184	246
4	.238	177	.....	88½	138	199	266
3	.259	193	.....	96	151	217	289
2	.284	211	.....	105½	165	238	317
1	.300	223	.....	111½	174	251	335
0	.340	253	.....	126½	198	285	380

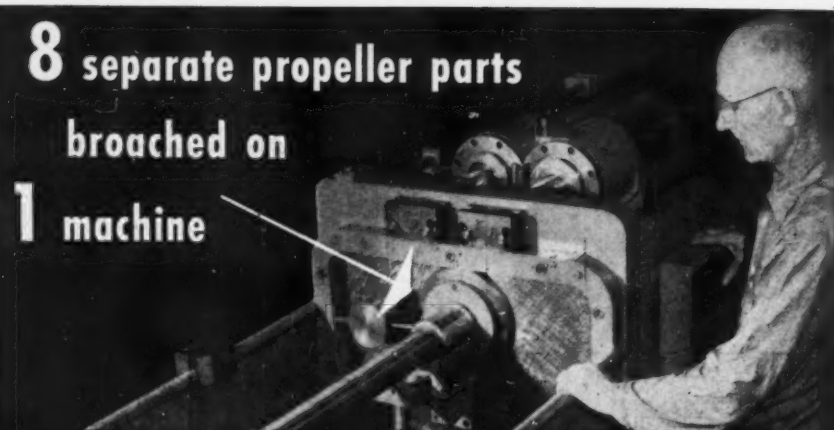
Approx. Wt. of Sheet Copper per Sq. Ft. in Fractional Parts of an Inch

1/8-inch thick.....	3	lbs. to the square foot
3/8-inch thick.....	6	lbs. to the square foot
1/2-inch thick.....	12	lbs. to the square foot
3/4-inch thick.....	24	lbs. to the square foot
1-inch thick.....	46½	lbs. to the square foot

To Ascertain the Weight of Copper—Find the number of cubic inches in the piece multiply by 0.3214, and the product will be the weight in pounds. Or, multiply the length and breadth (in feet) and that by the pounds per square foot.

These weights are theoretically correct, but variations must be expected in practice.

8 separate propeller parts broached on 1 machine



A PROPELLER MANUFACTURER GOT THESE BENEFITS
FROM HIS AMERICAN HORIZONTAL MACHINE:

1. Tooling is readily inter-changeable for eight separate parts of short run production.
2. Large parts are easily loaded and unloaded.
3. Double helical drive for right and left hand helix readily adaptable to machine.
4. The horizontal machine provided the most tonnage and stroke per dollar invested.



To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears.

Number of spline teeth vary from 43 to 55 with diameters ranging from $2\frac{3}{4}$ " to $3\frac{1}{2}$ ", and with length of splines cut ranging from $\frac{3}{4}$ " to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.



American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



BLUE BOOK'S Know How Reference Sheets

Permissible Variations from Specified Thickness

For Hot Rolled and Hot Rolled Pickled Sheets and Coils
Thickness Measured at any Point Not Less Than $\frac{3}{8}$ " from an Edge

Thickness	Variation, Over and Under, For Widths Specified											
	To 3½	Over 3½ to 6	Over 6 to 12	Over 12 to 15	Over 15 to 20	Over 20 to 32	Over 32 to 40	Over 40 to 48	Over 48 to 60	Over 60 to 70	Over 70 to 80	Over 80 to 90
Up to .0141	.002	.002	.002	....	....	....	.002	.002	....	....	....	....
.0142 to .0194	.002	.002	.002	.002	.002	.002	.002	.002	....	....	....	....
.0195 to .0254	.003	.003	.003	.003	.003	.003	.003	.003	....	....	....	....
.0255 to .0313	....	.003	.003	.003	.003	.003	.003	.003	....	....	....	....
.0314 to .0343	....	.004	.004	.004	.004	.004	.004	.004	.005	....	....	....
.0344 to .0388	....	....	.004	.004	.004	.004	.004	.004	.005	....	....	....
.0389 to .0508	....	....	.005	.005	.005	.005	.005	.005	.006	....	....	....
.0509 to .0567	....	....	.005	.005	.006	.006	.006	.006	.007	....	....	....
.0568 to .0709	....	....	....	.006	.006	.006	.006	.006	.007	....	....	....
.0710 to .0821	....	....	....	.006	.007	.007	.007	.007	.008	.008	....	....
.0822 to .0971	....	....	....	.006	.007	.007	.008	.008	.009	.009	.010	....
.0972 to .1419	....	....	....	.007	.008	.008	.009	.010	.010	.011	.012	.012
.1420 to .1874	....	....	....	.007	.008	.009	.009	.010	.010	.011	.012	.012
.1875 to .2499	....	....	....	.008	.008	.009	.009	.010	....	....	....	....

PERMISSIBLE VARIATIONS FROM SPECIFIED THICKNESS FOR COLD ROLLED SHEETS AND COILS

Thickness Measured at any Point Not Less Than $\frac{1}{8}$ " from an Edge

Thickness	Variation, Over and Under, For Widths Specified									
	Over 12 to 15	Over 15 to 20	Over 20 to 24	Over 24 to 32	Over 32 to 40	Over 40 to 48	Over 48 to 60	Over 60 to 70	Over 70 to 80	Over 80 to 90
Up to .0112	....	....	....	....	.0015	....	....	....	....	....
.0113 to .0141	....	....	....	....	.002	.002	....	....	....	....
.0142 to .0194	.002	.002	.002	.002	.002	.002	.002	....	....	....
.0195 to .0254	.003	.003	.003	.003	.003	.003	.003	....	....	....
.0255 to .0313	.003	.003	.003	.003	.003	.003	.0035	.004	.004	....
.0314 to .0388	.003	.003	.003	.003	.0035	.0035	.0035	.004	.004	....
.0389 to .0508	.004	.004	.004	.004	.004	.004	.004	.005	.005	....
.0509 to .0567	.005	.005	.005	.005	.005	.005	.005	.006	.006	....
.0568 to .0709	.005	.005	.005	.005	.005	.005	.006	.006	.006	....
.0710 to .0821	.005	.005	.005	.006	.006	.006	.007	.007	.007	....
.0822 to .0971	.006	.006	.006	.006	.007	.007	.008	.009	.009	....
.0972 to .1419	.006	.007	.007	.008	.009	.009	.010	.010	.011	.012
.1420 to .1874	.006	.007	.007	.008	.009	.010	.010	.011	.012	.012
.1875 and Thicker	.007	.007	.007	.008	.009	.010	.011	.012	.013	.015

SPEEDY AIR VISE

SPEEDS UP

✓ MILLING

✓ PUNCHING

✓ DRILLING

✓ BENDING

✓ TAPPING

✓ RIVETING



**FOOT
CONTROLLED:**

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more*! Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings . . . only **\$36.00**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

 <p>AIR REGULATOR Precision-built. Delivers pressures up to 140 lbs. With gauge. \$5.98 Less gauge, \$3.25</p>	 <p>AIR FILTER Keeps water and particles out of the regulator and pneumatic tools. \$3.00</p>	<p>BLOW-GUN</p>  <p>Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . \$3.00</p>
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W. R. BROWN CORP. • 2651 NORMANDY AVE. • CHICAGO 35, ILL.

BLUE BOOK'S Know How Reference Sheets

Wire and Sheet Metal Gauges

(in decimals of an inch)

Name of Gauge	United States Standard Gauge* U. S. Std.		Birmingham (or Stubbs Iron) Wire Gauge	New Birmingham Standard Sheet and Hoop Gauge	American or Browne & Sharpe Wire Gauge	United States Steel Wire formerly Washburn & Moen†	British Imperial or English Legal Standard Wire Gauge	Name of Gauge
Principal Use	Uncoated Steel Sheets and Light Plates		B.W.G.	B.G.	B. & S.	Steel Wire except Music Wire	S. W. G.	Principal Use
Gauge No.	Weight, Pounds per Sq. Ft.	Thickness, Inches	Thickness or Diameter, Inches					
7-0s	20.00	.4902	.....	.6666	.....	.4900	.500	7-0s
6-0s	18.75	.4596	.....	.6250	.580000	.4615	.464	6-0s
5-0s	17.50	.4289	.500	.5883	.516500	.4305	.432	5-0s
4-0s	16.25	.3983	.454	.5416	.460000	.3938	.400	4-0s
3-0s	15.00	.3676	.425	.5000	.409642	.3625	.372	3-0s
2-0s	13.75	.3370	.380	.4452	.364796	.3310	.348	2-0s
1-0	12.50	.3064	.340	.3964	.324861	.3065	.324	1-0
1	11.25	.2757	.300	.3532	.289297	.2830	.300	1
2	10.625	.2604	.284	.3147	.257627	.2625	.276	2
3	10.00	.2451	.259	.2804	.229423	.2437	.252	3
4	9.375	.2298	.238	.2500	.204307	.2253	.232	4
5	8.750	.2145	.220	.2225	.181940	.2070	.212	5
6	8.125	.1991	.203	.1981	.162023	.1920	.192	6
7	7.500	.1838	.180	.1764	.144285	.1770	.176	7
8	6.875	.1685	.165	.1570	.128490	.1620	.160	8
9	6.250	.1532	.148	.1398	.114423	.1483	.144	9
10	5.625	.1379	.134	.1250	.101897	.1350	.128	10
11	5.000	.1225	.120	.1113	.090742	.1205	.116	11
12	4.375	.1072	.109	.0991	.080808	.1055	.104	12
13	3.750	.0919	.095	.0882	.071962	.0915	.092	13
14	3.125	.0766	.083	.0785	.064084	.0800	.080	14
15	2.8125	.0689	.072	.0699	.057068	.0720	.072	15
16	2.500	.0613	.065	.0625	.050821	.0625	.064	16
17	2.250	.0551	.058	.0556	.045257	.0540	.056	17
18	2.000	.0490	.049	.0495	.040303	.0475	.048	18
19	1.750	.0429	.042	.0440	.035890	.0410	.040	19
20	1.500	.0368	.035	.0392	.031961	.0348	.036	20
21	1.375	.0337	.032	.0349	.028462	.03175	.032	21
22	1.250	.0306	.028	.03125	.025346	.0286	.028	22
23	1.125	.0276	.025	.02782	.022572	.0258	.024	23
24	1.000	.0245	.022	.02476	.020101	.0230	.022	24
25	.875	.0214	.020	.02204	.017900	.0204	.020	25
26	.750	.0184	.018	.01961	.015941	.0181	.018	26
27	.6875	.0169	.016	.01745	.014195	.0173	.0164	27
28	.625	.0153	.014	.015625	.012641	.0162	.0148	28
29	.5625	.0138	.013	.0139	.011257	.0150	.0136	29
30	.5000	.0123	.012	.0123	.010025	.0140	.0124	30
31	.4375	.0107	.010	.0110	.008928	.0132	.0116	31
32	.4062	.0100	.009	.0098	.007950	.0128	.0108	32
33	.3750	.0092	.008	.0087	.007080	.0118	.0100	33
34	.3438	.0084	.007	.0077	.006305	.0104	.0092	34
35	.3125	.0077	.005	.0069	.005615	.0095	.0084	35
36	.2812	.0069	.004	.0061	.005000	.0090	.0076	36
37	.2656	.0065	.....	.0054	.004453	.0085	.0068	37
38	.2500	.0061	.....	.0048	.003965	.0080	.0060	38
39	.2344	.0057	.....	.0043	.003531	.0075	.0052	39
40	.2188	.0054	.....	.00386	.003144	.0070	.0048	40



Dust and Debris . . .

Two Gangsters in Industry

By **Fuller Ross**

DUST and Debris—the cancer twins of industry—have long presented major operational problems in machine and tool industries.

Dust has a way of settling on products, in products, on costly machinery and its working parts, thus creating fire hazards and premature obsolescence of motors, and also affecting the health and welfare of workers. And, it is most obvious that the sole accomplishment of the common “pushbroom” is nothing more than to activate dust.

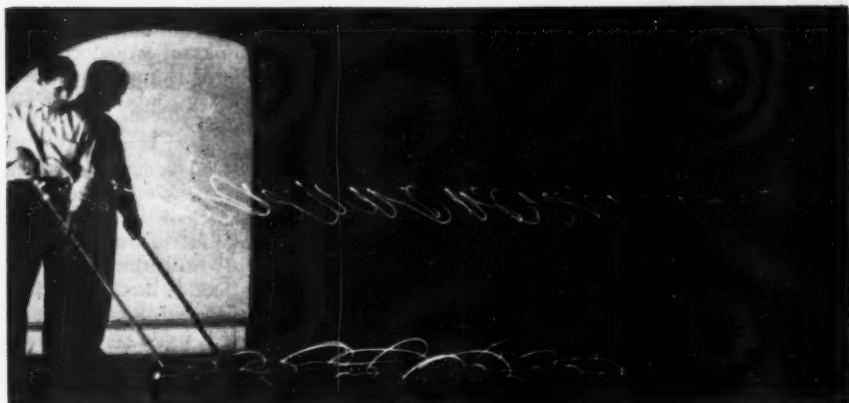
Debris—the working partner of dust—also has an ulterior purpose, which includes cluttering up aisles, work space, causing fires and accidents and a general cutting down of efficiency. Yet, with all this overwhelming evidence, some of today’s most modern factories still employ expensive squads of sweepers equipped with straw “pushbrooms.”

Elimination of these two shop “gangsters” is not entirely possible but strict control over them can be exercised by efficient disposal methods. Without per-

sistent and effectual elimination of unwanted waste, cluttered up floors mean slow production, packing and delivery. “Pushbroom” methods of waste disposal are antiquated!

The cost of keeping industry’s platforms and floors free of dust and debris is constantly rising with the steady increase in cost for broom sweeping labor. Studies of this widespread and vital operation—floor cleaning—have not only proven the rising cost of floor sweeping labor, but have also proved that mechanical floor cleaning vastly reduces cost, cuts cleaning time and keeps floors and platforms cleaner.

Today’s modern, large floor type suction machine or motorless mechanical floor sweeper, adapted to large floor areas, can mean savings up to 80 per cent of the cost of cleaning in shops, storage and processing plants. Shop management will find some guidance in the following recap of present day developments of various types and devices of floor cleaning techniques.



Motions performed when worker uses pushbroom to sweep floors.



The same operation with worker using a mechanical sweeper.

		Generally accepted standard is
Hand vacuuming	using floor wand and hose	1,500 sq. ft./hour
Hand sweeping	push broom, shovel, barrel	3,000 sq. ft./hour
Mechanical vacuuming	with floor type vacuum	20,000 sq. ft./hour
Mechanical sweeping	with motorless sweeper	15,000-22,000 sq. ft./hour

The suction sweeper won't pick up:

Wet, oily or sticky substances; hardware or similar metal objects; stiff or excessively large articles.

But it will pick up:

Lime, fluff, dust, powder, lampblack, carbon, talc, abrasive dust, dry sand, wood chips, wood flour, sawdust, wood shavings and small chunks of wood, chicken refuse, string, twine, paper, cloth, wiping waste, tape, webbing, scraps of rubber, mica flakes, iron oxide flakes, plastic scraps and grindings, tags, labels, cigarette wrappers, match book covers, thread, leather and paper dust.

Hundreds of tool shops have adapted the mechanical floor and platform cleaning system, and this basic type of mechanical sweeper is being looked upon as the "leader" in putting the old-fashioned "push-broom" where it belongs—back in the closet.

The mechanical sweeper has a very definite purpose. It is completely effective in lowering floor cleaning labor costs, doing a better cleaning job, and doing it faster with a minimum of disturbance.

This floor cleaning method has been adopted by a large and growing percentage of the tool industries. These include: Cushman Chuck Co., Loneragan Manufacturing Co., Victor Adding Machine Co., Cincinnati Gilbert Machine Tool Co., Singer Manufacturing Co., Hansom - Van Winkle - Munning Corp., Saco-Lowell Shops, Rivett Lathe & Grinder Co., Meisel Press Manufacturing Co., Remington Rand, Inc., Grinnell Corp., New Departure Division, General Motors Corp.

An important advancement is found in the heavy duty suction floor cleaner which works in aisles and on platforms and performs functions which go well beyond the capacities of the mechanical sweeper. The wide-orifice of this suction cleaner (31.5 square inches) keeps properties free of trash and dust on a 22-inch path at speeds up to 20,000 sq. ft. per hour.

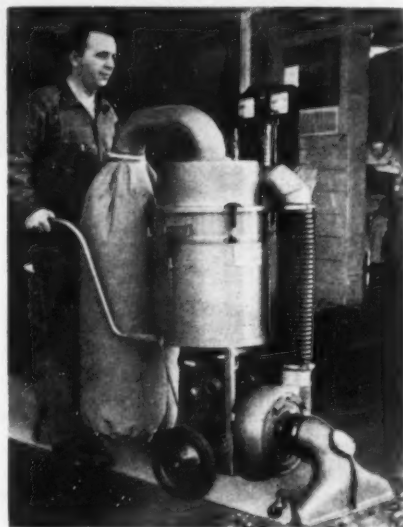
It offers a new concept of speed and efficiency in collecting dust, powder, and ordinary traffic litter from factory floors; aside from elaborate built-in systems and air-conditioning there has been heretofore no practical equipment available for effective dust control on floors.

Powerful industrial vacuum cleaners are effective, but slow on large floor areas. Mechanical floor sweepers are fast and efficient, but not suitable for dust collection. To fill this need for high speed and effective dust collection, a new machine has a large suction nozzle mounted in a fixed position just above the floor surface.

The wide orifice permits collection of large pieces of scrap and litter without clogging. It is powered with gasoline or electric power capable of moving 860 cu. ft. per minute.

Cleaning by air movement is the only similarity with conventional industrial vacuum cleaners. The latter depend on high suction power (measured in terms of inches of waterlift) derived by high speed movement of air

A new vacuum type sweeper.



through narrow orifices. New suction sweepers work on the principle of volume rather than speed. It moves a large mass of air (relatively slowly) through a wide open orifice. This results in a low waterlift rating but an extremely high rating in terms of cubic feet per minute.

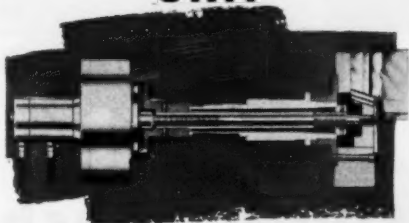
A direct driven impeller turning 3,450 R.P.M. which draws in 860 cu. ft. of air per minute. This compares with 200 cu. ft. of air handled by some of the more powerful industrial vacuums; the open stage impeller has housing clearance which permits passage of any material which can enter the suction orifice, measuring 22 x 1½ inches; choice of gasoline engine or electric motor; total weight of 120 pounds moved on ball bearing wheels; power propulsion not needed. Separation by cyclonic precipitation into a can of most of the material and dust picked up. Only residue and light bits of paper enter the filter bag; the filter bag has exceptional filter area which allows air to escape without reducing velocity; large emptying aperture; removable can and bag which can be emptied and replaced quickly.

The motorless sweeper, previously referred to, is used as a substantial time-saving and labor-saving aid in sweeping floors of freight cars, shipping docks, and plant areas. The sweeper operates mechanically with no engine or motor to complicate performance. It is simply rolled along the floor by the operator. As the wheels rotate, a brush inside the sweeper revolves in the opposite direction, whisking dirt, trash, dust and debris forward into a detachable aluminum hopper that one man can easily empty with one hand. The amount of pushing effort required ranges between 9 and 11 pounds, depending on model and attachments.

Sweeping paths range from 20 to 40 inches wide, and sweeping speeds, as shown by time studies, range from 15,000 to 22,000 sq. ft. per hour.

The End

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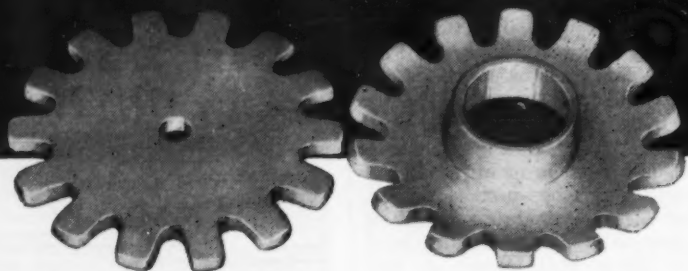
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"The straight-grinding feature also permits successful extruding and has eliminated the former drilling operation."

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How Ryan Forms Titanium

By Frank Clarity

A RESEARCH program recently completed by Ryan Aeronautical Company at San Diego, Calif., has shown that commercially-pure titanium can be either cold or hot formed with punch presses, bending rolls, brake presses, hydraulic presses, and hammer facilities.

Initial punch press operations involved the use of an integrally-heated universal die which was theoretically capable of forming radii ranging from 0.030" to 2.50" and depths of 0.250" to 2.50" on 0.040" RC-70 and 0.026" TI-75A sheet stock with forces of 105 tons.

Attempts to utilize this die for cold forming operations were generally unsatisfactory. Only a small area at the end of the arms of an 0.025" part could be formed without cracking or splitting, and material thicknesses were reduced only 0.001" to 0.002" before complete failures occurred. However, the work did indicate that punch presses can be used to cold form relatively simple parts with shallow draws and generous bend radii.

Subsequent efforts to form titanium blanks with a No. 7½ Verson punch press and dies electrically heated to 275° F. were satisfactory only where 0.025 TI-75A materials were preheated

to about 900° F. This led to the conclusion that better results could be obtained if proper draw-pad pressures, higher die temperatures (600° to 700° F.), and appropriate high temperature lubricants were employed.

High temperature forming lubricants that have now been investigated by Ryan in connection with titanium include copper plating (with and without a powder-type lubricant), petroleum lubricants, colloidal graphite, molybdenum disulfide, and chlorinated wax. Resultant data indicate that either molybdenum disulfide, colloidal graphite, or copper plating will give excellent results if utilized in conjunction with a conventional forming lubricant in work with blanks preheated to 700° F. However, this conclusion is based entirely on work that has been accomplished with 0.025" RC-70 sheet stock.

Roll forming tests were initially made with 0.018" Ti-75A, 0.025" Ti-75A, and 0.040" RC-70 strips with 2½" x 36" dimensions. The strips were formed into Z-sections on a brake press and then rolled to various radii on a Buffalo bending roll.

All of the Z-sections were rolled to the minimum bend radius of the machine without cracking or splitting.

However, there were some wrinkles in the flanges of the test specimens. The wrinkles were manually removed with sheet metal shrinkers and hammers with no more difficulty than could be expected in work with stainless steel.

Minimum bend radii for 0.018", 0.040", and 0.125" gauges of titanium have been established at Ryan by using a Sturdy Bender brake press to bend 1" x 2" test specimens. Bends were made with the roll letter markings down, except in special cases where specimens were bent with the lettering up in order to evaluate a report that the materials could be satisfactorily bent from one side only (a report, incidentally, which was not confirmed). Dies of decreasing radii were used until a fracture occurred; and, if there was no fracture after the specimens were bent through the largest angle obtainable with the brake press, the specimens were placed in a vice

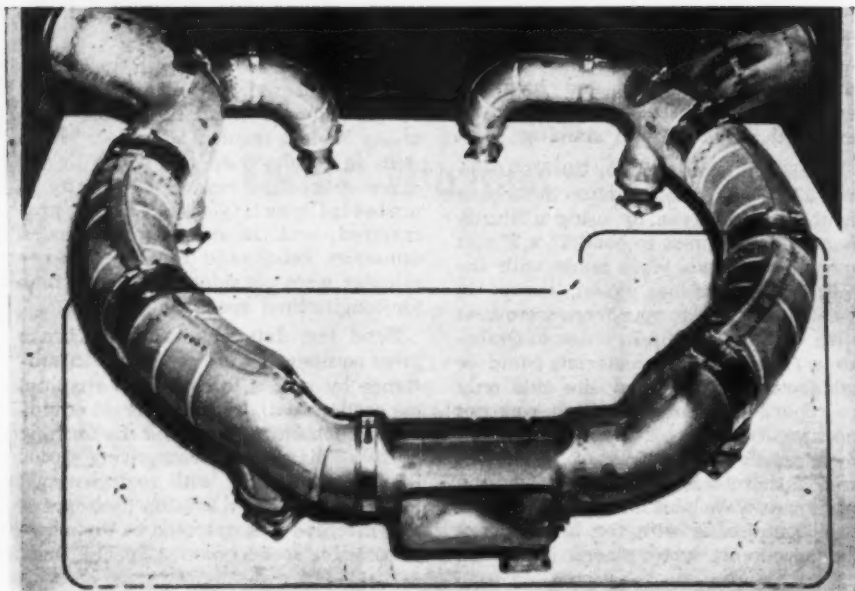
and bent until either a 180° bend or a rupture was attained.

Specimens were bent with their edges in the as-sheared, as-milled, and polished conditions without noticeable variations in test results. However, variations in results from one gauge to another—indicating lack of uniformity in material quality—were fairly pronounced; and, in most circumstances, minimum bend radii for transverse samples were considerably higher than for longitudinal specimens.

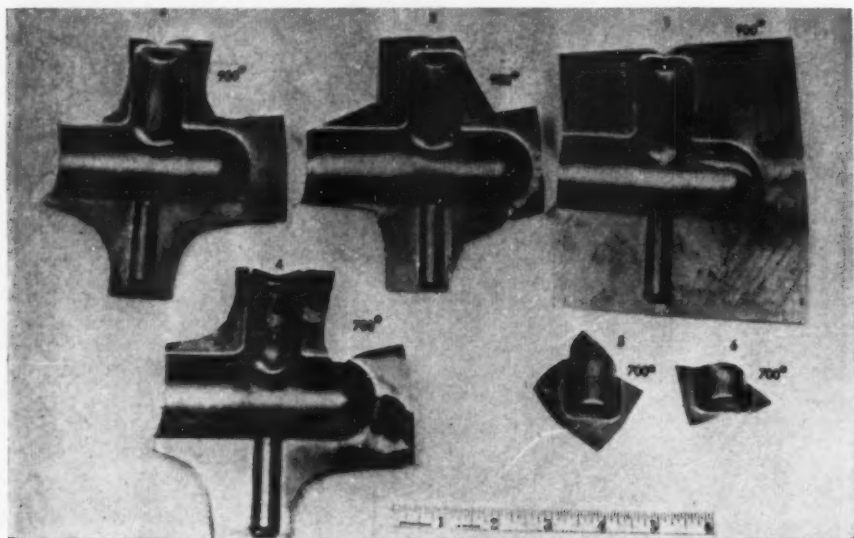
Bend test data obtained with brake press equipment were confirmed in substance by efforts to cold form titanium hat sections with hydraulic press equipment. Such efforts involved the forming of 10 $\frac{1}{4}$ "-dia. blanks comprising 0.040" RS-70 and Ti-75A with a drawn pad force of 19 tons in a 250-ton hydropress. The machine was operated at the slowest possible speed (about 1" per second)

Parts of the types shown here have been satisfactorily produced by cold forming titanium sheet stock.





This helicopter exhaust system was made by assembling formed titanium parts at Ryan. **Stampings by hot forming** preheated 0.025" Ti 75A sheets over a die which was integrally heated at 250° F. Preheat temperatures are indicated above respective parts.



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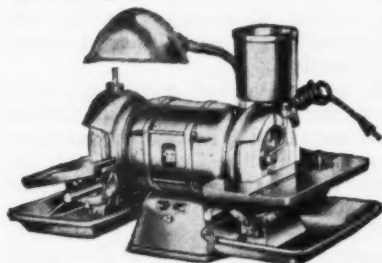
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to allow the blanks a maximum amount of recovery time during forming. The blanks were coated with a dry lubricant to minimize galling and seizing due to friction.

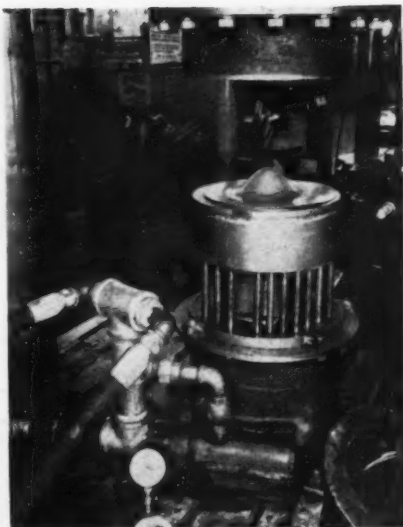
Blanks comprising RS-70 were successfully converted into hats with a 7½" O.D., a 5⅞" I.D., and a depth of 3½" where four successive draws were made without removing a given part from the die. Where attempts were made to form the same blanks into the same hats in one pass, the materials fractured just before completion in the radius at the bottom of each part (due to seizing over a radius which was too small for titanium draws of this type).

The Ti-75A blanks all failed before hats with the aforementioned dimensions could be more than half completed—sometimes, in fact, before the draws were 25% complete. In view of the mechanical properties of Ti-75A and RS-70, this seemingly indicates that the transverse bend properties of a titanium sheet represent a good criterion of its formability.

In fabricating titanium parts with drop hammer equipment, Ryan has made successful use of inexpensive lead punches and Kirksite dies. Such work does not greatly reduce the lifespan of the tooling; for, even where titanium blanks must be preheated to 700° F. or more, a protective sheath over the punch and a short contact time prevent excessive heating.

Drophammer dies are not preheated or integrally heated, since experience has shown that this would serve no practical purpose. Staging or progressive tools are specified for relatively deep and/or complex draws, much the same as in forming stainless steel. High temperature forming rubber is used between the punches and blanks.

Lubricants have to date been of limited value in hammer forming commercially-pure titanium sheets. However, improved results have been obtained in several circumstances by applying SAE



Close up view of tooling used to form titanium by means of a "trapped rubber" technique.

250 worm gear oil to various die surfaces.

A holding furnace has to date been used to heat and reheat titanium prior to and during forming operations. Since this is not an efficient production heating method, Ryan engineers are now investigating the possibilities of resistance heating.

A "trapped rubber" technique—similar to the well-known Guerin process—has been used to impact form titanium parts with a large Ceco Stamp. It involves the use of "live" rubber, retained by a heavy steel die box, to compress titanium sheet materials over relatively inexpensive form blocks. It is a satisfactory cold-forming method where shrink flanges are not involved, and where adequate allowance has been made for springback; also, it has given very good results where blanks were preheated to temperatures of about 1000° F.

The End.

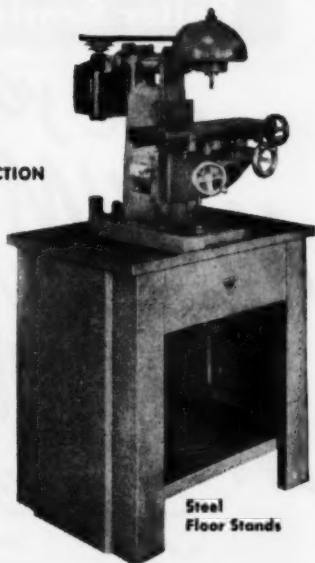
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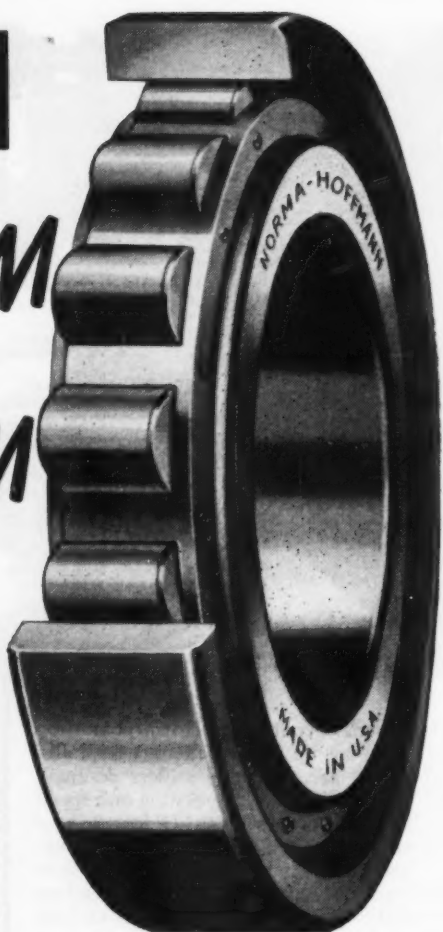
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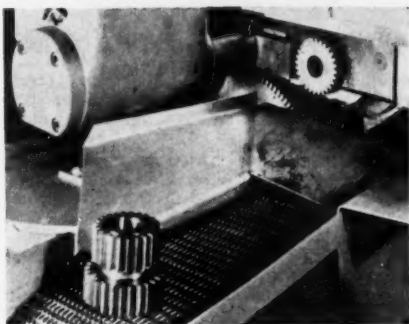
Production Finishing of Two-Gear Cluster

Production shaving of a two-gear cluster for farm tractor transmissions poses a machine requirement of high production and flexibility. The same machine is used to finish both gears in the cluster and it must be capable of performing the shaving operation to the required accuracy with a minimum time loss for changeover.

To attain a production rate of about 240 gears per hour a Model 870 underpass gear finisher built by Michigan Tool Company, Detroit, Mich., is automation equipped. The only operator attention required is putting parts into the loader. An automatic sizing fixture at the entry end of the loader prevents the loading of over-size parts, so that only gears that are within size limits for shaving pass through. This results in faster shaving and more accurate gears as well as giving maximum cutter life.

Since one of the gears in the cluster has 23 teeth with a 14 normal pitch and a 1.6429-pitch diameter and the second has 28 teeth with a 14 normal pitch and a 2-inch pitch diameter the machine setup is changed for each shaving operation. Only three steps are required in the changeover and are accomplished in a few minutes: (1.) Center distance is changed by means of a handwheel; (2.) sizing fixture is changed by removing four bolts; (3.) the sub-plate, mounting the head and tailstocks and the loader, is positioned by lining up locating markers (visible at front of machine).

A cylinder pushes the gear to be shaved into a round carrier with a diameter equal to that of the larger gear. When a limit switch is tripped on retraction of the cylinder, a second cylinder at the back of the machine pulls the gear into shaving position. An arbor moves into position and holds the gear for the shaving



operation. Movement of the arbor into position causes a limit switch to be tripped, starting the underpass shaving cycle.

When the cutter stops at the end of the shaving cycle another limit switch is tripped causing the arbor to retract and the gear carrier to return to loading position. The next gear being moved into shaving position pushes the finished gear onto a chain conveyor which carries it to a stock tray or to another conveyor, as desired.

During the shaving operation, 0.005-inch of stock (measured over two pins) is removed. The 23-tooth gear is shaved at a rate of 240 per hour with output of the 28-tooth gear being slightly lower.

Cold drawing with tungsten-titanium carbide mandrels

Reduced mandrel costs together with elimination of practically all tube scrapage, is being realized at the plant of a prominent midwestern fabricator by a



switch from chrome-plated steel mandrels to those of tungsten-titanium carbide for cold drawing seamless steel tubing.

Their operation, which is performed at 75 feet per minute on a 150-horsepower Aetna-Standard cold-drawing bench, consists of reducing a 1½" diameter by 0.083" wall SAE 1010 steel tubing to 1¼" diameter with a 0.063" wall. Tube length when brought to the draw bench is 9'-8"; after processing, length is 15'-9". Both outside and inside diameters of the tubing are held to tolerances of +0.001, -0.005".

Average draw-life of their previously used chrome-plated mandrels and others made of standard carbide material was only about 500 feet. Since chrome mandrels cost \$2 each, mandrel cost per foot of tubing produced was \$0.004, or 40 cents per hundred feet. At the time of the fabricator's last report, their Kennametal grade K-84 mandrel nib had drawn 440,435 feet, showing only 0.003-inch wear. Under their new mandrel setup, cost is only about 1-1/10 cents per hundred feet.

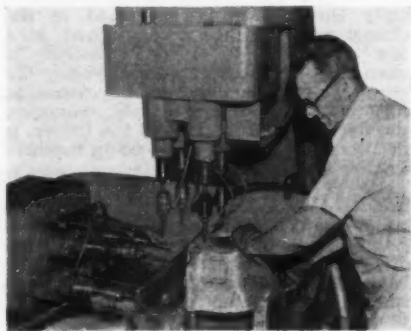
This same amount of production would have required 880 chrome mandrels at \$2 each or a cost of \$1760. Since scrappage with chrome mandrels averages about 5 per cent, a production of 440,435 feet would have resulted in 22,022 feet of scrap tubing. At 15½ cents per foot, loss would have amounted to about \$3413. To date their carbide nibs have provided them a savings of over \$5000. Additional production savings are also obtained as a result of minimized machine-downtime required for mandrel changing. Equivalent results are obtained in other similar operations using larger sizes of carbide mandrels.

Machine tooled for no-breakage tapping

This Buhr two-way tapping machine is equipped with a new type of adjustable-torque releasing driver, which has virtually eliminated tap breakage bugaboos.

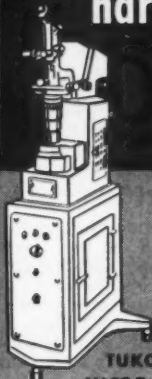
Manufactured by Buhr Machine Tool Co., Ann Arbor, Mich., this special machine is designed for tapping four 5/16-18 and four 7/16-14 Class 2 holes in die-cast aluminum transmission cases. After operating the machine for more than eleven months, the user reports tap breakage is practically nonexistent due to the reliable, complete releasing action of the new tap drivers. Manufacturers of the new "Safe-Torque" drivers, Scully-Jones and Company, Chicago, Ill., report similar results are being experienced on a variety of tapping jobs, with increases in tap life as high as 400 - 500%. Two features of the driver are said to be responsible for its ability to protect taps against breakage normally caused by hard spots, inadequate cooling or lubrication, dull taps, improper sharpening, and other adverse machining conditions.

One, a spring-loaded centering plug (see sketch) absorbs shocks when bottoming in blind holes. The cushioning stop and instantaneous release of the driver permit bottom-tapping at full speed to full depth without breakage. Second, a feature that is unique in holding and driving tools is the over-running roller drive, which releases completely when torque approaches strength limits of the tap. In releasing, the outside member of the driver revolves around the inner drive-collet member on anti-friction ball bearings, thus eliminating friction, heat, and wear caused by slipping friction surfaces and overriding teeth of clutch-type drivers. According to the manufacturer, this feature is the secret of the tool's



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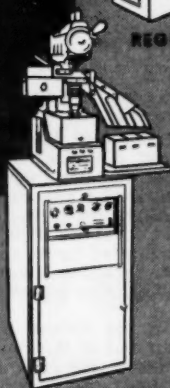
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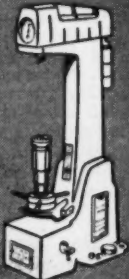
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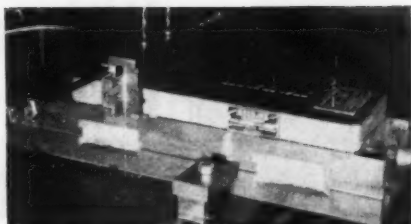
230-T Park Avenue, New York 17, N. Y.

ability to almost eliminate breakage and help produce a greater percentage of higher quality piece-parts.

Pneumatic vises used in multiple drilling

The I-T-E Circuit Breaker Company has used pneumatic vises in an interesting application, involving the drilling of 17/64" holes on a multiple spindle drill press. Material was copper, r.p.m., 2400, feed 2 1/2" per minute and the air vise was an Airlox Model S-50. This vise develops a rigid grip on the work of 90 times air line pressure.

Data on operations as follows:
Multiple spindle drill press....H-6 Natco



Air vise	S-50 Airlox
Material	copper
Drills	17/64"
R.P.M.	2400
Feed	2 1/2" per minute

Machine saw-cuts cap from connecting rod

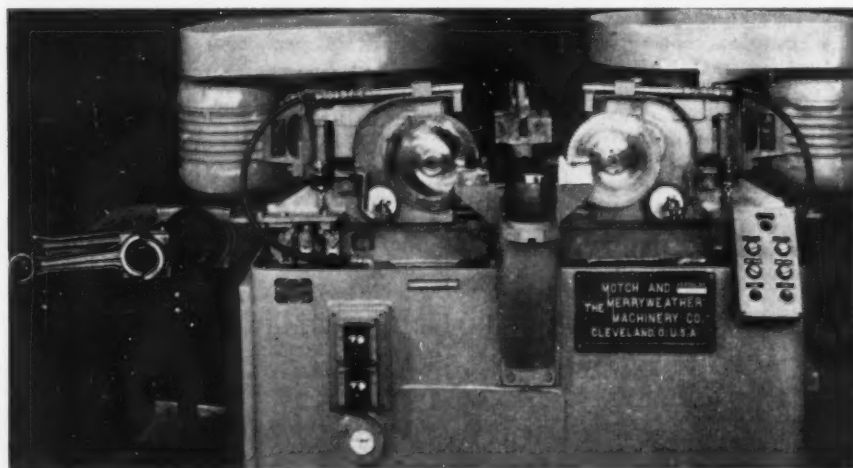
The Motch & Merryweather Machinery Co. has designed and produced a machine which accurately saw-cuts the cap from the connecting rod. The machine consists of right-hand and left-hand sawing heads mounted on hardened and steel ways on a base of suitable proportions. The saw heads carrying high speed triple-chip circular saw blades are fed by means of hydraulic cylinders simultaneously from each side of the forging to part the cap from the shank.

The part is located in the fixture by placing the machined pin end of the connecting rod over a hardened and ground locating pin with hardened steel blocks,

providing location at the crank end where the saw cut is to be performed. Clamping is accomplished by a hydraulic cylinder over the top of the forging at the crank end.

The right- and left-hand geared saw heads are driven by 2 h.p. motors. The external hydraulic sump is furnished with a hydraulic pump, a 2 h.p. motor, valves and piping in accordance with J.I.C. Standards.

In the cycle of operation the operator places a connecting rod in the fixture and presses a button to start the automatic cycle. This cycle consists of clamping the stock, the opposing saw heads to feed to the reset distance and return and the fixture clamp to open. The operator repeats the cycle by removing the com-





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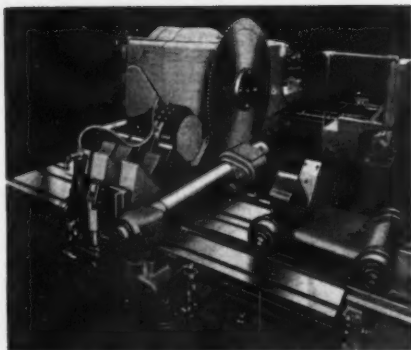
pleted rod and putting another one in its place.

Circular sawing machine

For cutting off ferrous or non-ferrous material, the Motch & Merryweather Machinery Co. has extended its line of circular sawing machines by adding a larger No. 5 model to cut stock up to 43" in diameter.

In the non-ferrous, low speed type of machine, the saw carriage is mounted on a heavy base at right angles to a heavy tee-slotted work-supporting table. The saw carriage, single speed type, has additional feed variations available by means of sheave change or by change gears. This saw head is powered by a 30 h.p. 900 r.p.m. motor connected by multiple belts and sheaves to the gear train. The final spindle drive has large, heavy duty, herringbone gears. The face of the spindle is 20" in diameter, with four pins supplying the mounting and saw blade drive.

Stock to be cut is placed in the vee block at the front of the machine. Clamping is by means of hydraulic cylinder connected through linkage to a heavy roller chain. Large diameters are accommodated by removing jaw sections of the vee block and moving it forward.

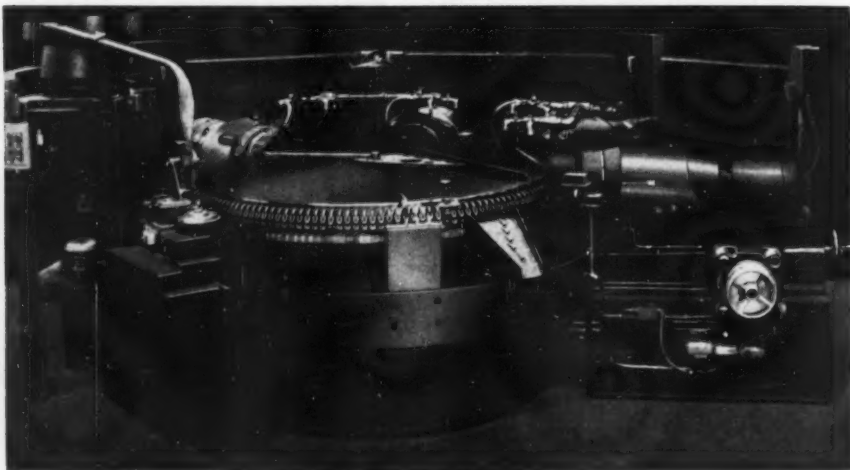


Power is applied by a gearhead motor. The roller is elevated by two hydraulic cylinders interconnected through the work-holding base. Additional support is provided by heavy duty dolly mounted on rails adjacent to the work-holding base. All movements, including the head feed and feed control, are hydraulic, the power being provided by a hydraulic pump driven by a 5 h.p., 1200 r.p.m. motor, using a floor mounted tank. Electrical and hydraulic system is substantially in accordance with J.I.C. standards. Motch & Merryweather Machinery Co., Dept. BB, Penton Bldg., Cleveland 13, Ohio.

Automatic grinder

Motch & Merryweather Machinery Co., Dept. BB, Penton Bldg., Cleveland 13,

Ohio, designed the automatic grinder for grinding a spherical radius on the heads of automotive valve tappets. The radius



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is produced exactly according to the radius of the table with the .015" of metal removal provided by four grinding spindles mounted at right angles to the fixture.

The tappets are placed into the hopper and from this hopper introduced into a double track loading mechanism cammed to load two tappets into the fixture at a time. The table containing the 160 individual fixtures rotates continually at approximately 140 inches per minute in a clockwise direction.

The tappets are clamped firmly in the V-type holding fixtures. The continuous clockwise rotation of the table passes the tappets across the face of the rotating grinding wheels with each of the four horizontal Blanchard heads removing a portion of the stock. The fourth head is

equipped with a special grinding wheel to provide a good finish. Each grinding head is equipped with automatic head infeed to compensate for wheel wear. Each grinding head slide is provided with a hand adjusting screw to permit retracting the heads for grinding wheel replacement. After having been finish ground, the tappets are automatically ejected into a take-off chute, and the open fixtures are flushed by coolant before reaching the automatic loading station. A central coolant system furnished by the customer provides coolant at each operating station.

Production is approximately 4000 pieces per hour at 100 per cent efficiency. The surface finish obtained averages approximately 10 micro inches.

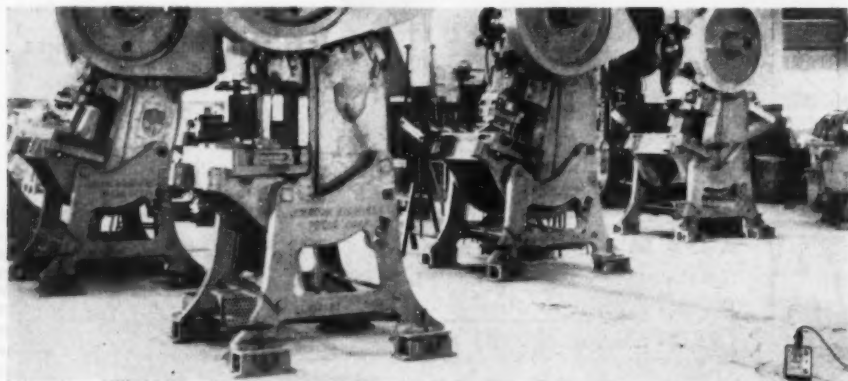
Increased press speeds without dangerous vibration

Wells Specialty Co., Inc., of North Liberty, Indiana, found it could increase personnel efficiency and rapidly rearrange the press line with each job change. The presses range from 18 to 200 tons capacity.

The high press speeds, however, created a very serious vibration problem—the floor was cracked, dishes were being shaken in houses several hundred feet away, and the noise was terrific! The

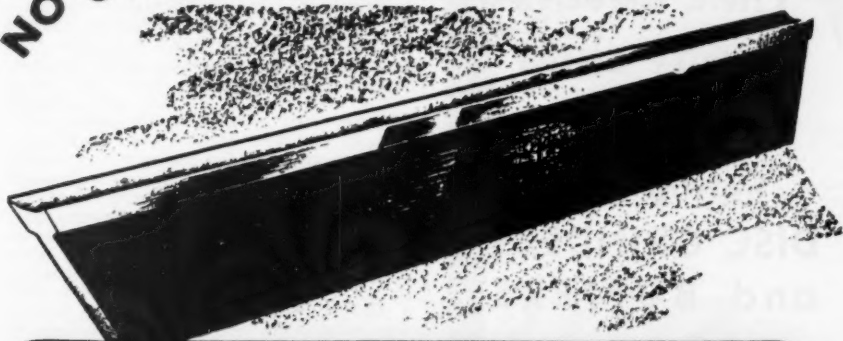
solution to this vibration problem was further complicated by the fact that the presses could not be bolted to the floor if maximum mobility of the equipment were to be maintained.

Korfund engineers recommended that the presses be mounted on Korfund Type LK Steel-Spring Vibro-Isolators, which gave highly satisfactory vibration control. The isolators were cemented to 1/8" thick felt pads which were in turn cemented to the floor, eliminating foundation bolts and making it easy to rearrange the presses when necessary.



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Filtration saves on grinding operations

Maintenance necessary in connection with varied grinding operations on parts for signal systems was costing the General Railway Signal Company a sizable sum of money. Cleaning the grinding machine sumps cost \$3800 yearly for labor, while maintenance of the sump pumps also required a considerable annual outlay. In addition, \$1152 a year had to be spent on coolants for the grinding operations, and losses in raw materials through rejects due to poor finish were excessive. These conditions made it apparent that coolant filtration equipment should be installed. After this was done no labor had to be diverted to cleaning grinder sumps, coolant costs were reduced to \$600 a year, maintenance on the sump pumps was eliminated, and rejects were held to a minimum.

The General Railway Signal Company of Rochester, N. Y., manufactures signal systems and appliances to protect and facilitate train operations. Much of this equipment must operate automatically, day and night, under all sorts of weather conditions. Therefore, precision machining of many of the parts is specified by the engineers to insure perfect functioning of the equipment.

Before a continuous filtration system was installed the oil used as a coolant in the grinding operations became highly



contaminated in a short time. Not only was production slowed, but all individual grinder sumps had to be cleaned each week and 2200 gallons of oil discarded.

After a thorough study of coolant purification, management decided to install a central filtration system for coolant restoration.

The equipment used in these grinding operations consists of Heald Internal Grinders, Thompson Grinders, Landis External Grinders, Norton External Grinders, Majestic Internal Grinders, Gallmeyer-Livingston Grinders, Blanch-



ard Surface Grinders, and Cincinnati Centerless Grinders. The oil clarification unit of this fully automatic filtration system is a Hoffman Model 56 Flotation Unit with a flow rate of 300 gallons per minute.

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one drill press does the work of FOUR

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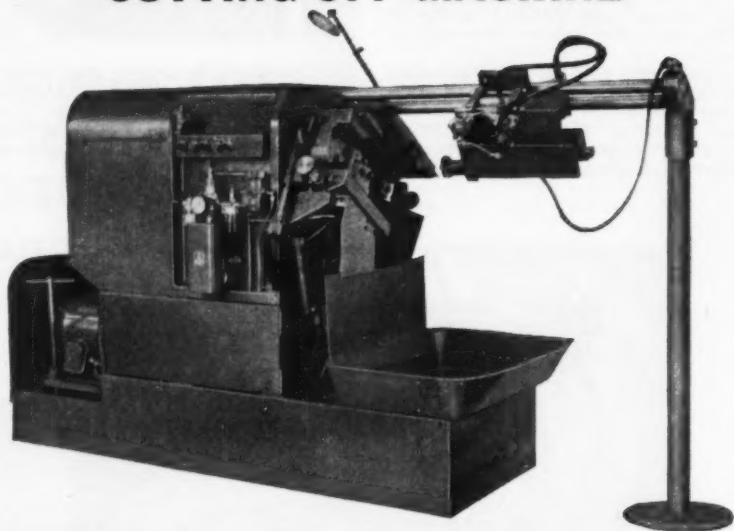
Drill — ream — countersink and counter-bore, all on one drill press without setting up for each operation. A simple rotation of this turret head brings any one of four drills or cutting tools into position. Accurate — fast — economical! Try Quadrill — it will earn you more profit thru less production cost.



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This machine cuts off and chamfers both outside edges of 1/2" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

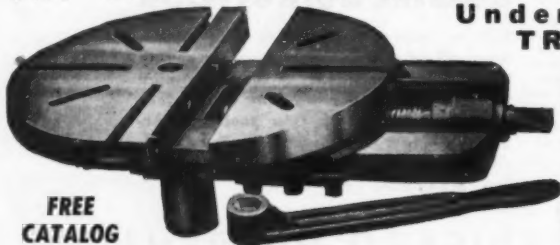
1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of 1 1/4" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

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Shop HINTS



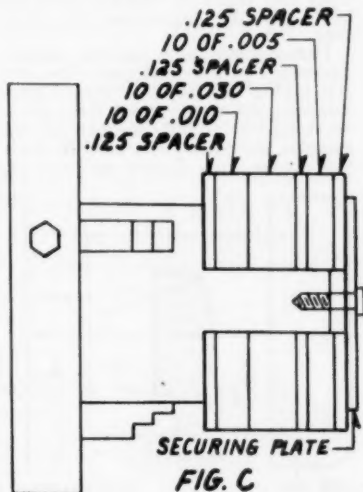
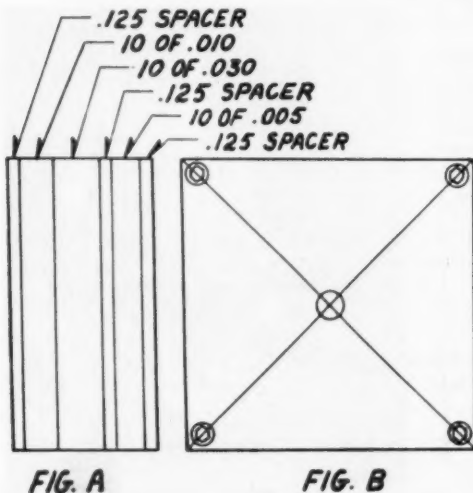
To Turn OD & ID Washers of Light Gage Metals in Lathe

By E. W. Pochervina

If you want to make 10 washers of each of .005, .010, and .030 thickness with a finished O.D. of 2.500 and I.D. of 1.006, first square shear stock to 3" square. Ten of each thickness desired plus 3 of .125 to be used as spacers. After you secure same, arrange them as shown in figure A. Then clamp them securely together and drill a hole in all four corners to take a $\frac{3}{8}$ " bolt. (figure B) After bolting securely, blue face of one spacer and draw line from each corner to find approximate center. (figure B) Then drill and ream this center to slip fit a $\frac{1}{2}$ " dowel pin. This is done in a drill press. Next, fasten work piece to a face plate on the lathe. Be certain to clamp outside of finish I.D. washer desired. Slip dowel into hole previously drilled and reamed in drill press. Leave enough of dowel extend out to indicate

on it for centricity.

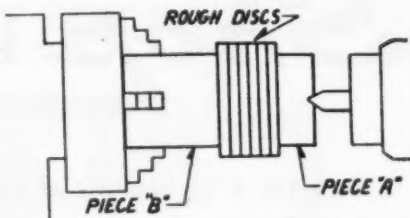
After finishing I.D., remove work piece from face plate. Remove face plate from lathe and put on 3" jaw chuck. Take a piece of machine steel bar stock, approximately $\frac{1}{4}$ " smaller than O.D., which in this case would be 2.500 less .060. Turn down bar to slip fit 1.006 I.D. of work piece, being sure to only cut back on machine steel piece to within .060 of combined thickness of spacers plus washer material. In this case .925 less .060. Now center drill, drill and tap, to receive $\frac{1}{2}$ bolt, in end of arbor (figure C). Then slip work piece on arbor, and take securing plate (figure C) and bolt to end of arbor. After making sure it is tight, remove the four bolts from corners and proceed to turn O.D.



To Turn Discs of Light Gage Metal Down To Any Given O.D.

By E. W. Pochervina

1. Chuck up piece of machine steel bar stock in lathe.
2. Face off, drill center—for center of tail stock later—turn down to O.D. to .010 less than you wish light gage discs to finish at.
3. Remove this piece from lathe and have end not faced faced off, ground flat with surface grinder. This piece will now be called "A."
4. Chuck another piece of bar stock in lathe.
5. Face it off and turn it down to 0.10 less than you wish it to finish. Leave this piece in lathe chuck. This piece will now be called "B."
6. Now take discs of light gage metal, which have been roughed to within an eighth inch of finished dimension on



band saw. Place these rough discs against piece "B", bring up tail stock and enter center into drilled center hole on piece "A" (flat ground side towards rough discs). Snug up pieces with tail stock and now secured light gage discs are tight enough to be turned.

Laying out suggestion

By Federico Strasser

The toolmaker often must solve by himself the problems, large or small, of his trade. The following is an explanation of a simple suggestion which facilitates the laying out of some special work-piece.

In a die-plate, the blanking opening outline contained also an arc with such a great radius that the center lied outside of the die-plate. In an effort to solve the problem, I took a flat piece of planed steel and clamped together both the die-plate and the supplementary piece in a vise.

The opportunely drawn center line, necessary in the first place for the original laying out, is very useful because it happens in many cases that during the working-out of the die-opening, the lines become somewhat blurred. In such cases the center line, drawn on both the die-

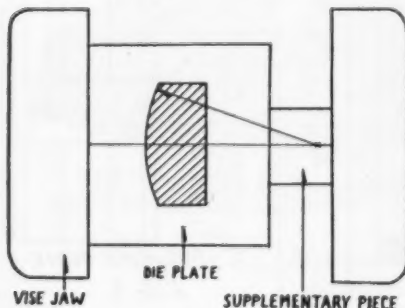
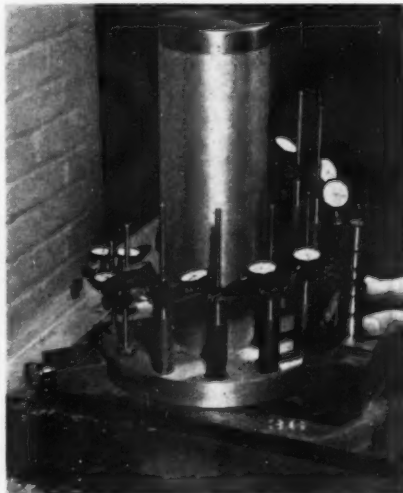


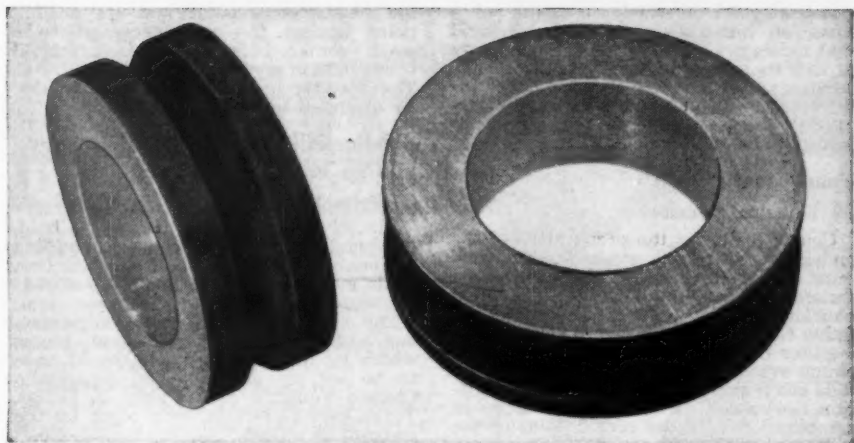
plate and the supplementary steel piece, helps to a quick and correct re-location between them of the two work-pieces.

Inspection problem solution

This is how Norton Company of Worcester, Mass., solved a problem in inspecting hydraulic valve parts. The job consisted of checking the location of grooves in a cylindrical valve part for a precision grinding machine. The usual inspection methods were time consuming.

Norton inspectors and engineers de-





How Flame-Plating keeps **DOWN-TIME** Down

Deep grooves worn in straightening rollers by small diameter wires often badly score larger wires which are passed through the same set-up. The result—costly machine down-time periods are necessary to change rollers. One manufacturer solved this problem by using rollers Flame-Plated with wear-resistant tungsten carbide. Now, machine down-time costs are at a minimum and a better product is produced.

Flame-Plating is a new LINDE process for applying wear-resistant coatings of tungsten carbide to the wear surfaces of parts and many tools made of most common metals. For the full story on how you can solve your wear problems with Flame-Plating, send for new "Flame-Plating" booklet.

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vised a quick method consisting of a precision turntable with eleven Federal dial indicators mounted on the periphery at heights corresponding with the groove locations. As the table is turned, the indicators bear on each surface in succession. Inspection time per piece has been cut drastically.

Handy center drill

By Federico Strasser

Center drills for the preparation of the end-holes of round work-pieces which must be turned between centers, are used generally in combination with drill-press chucks, and put in the tailstock of the lathe. Nevertheless, there are cases where—either because there is momentarily no chuck available or for any other reason—it is convenient to have a special execution center-drill, which works simply in combination with the center point of the tailstock.

The special center-drill is made from any ordinary center-drill, preferably from one which has broken at one end. This end is then carefully annealed and machined opportunely; face turned and a center hole of 60 degrees drilled in perfectly concentric position. After hardening, the tool receives a handle constituted by a flat iron bar in which is made a sliding fit-hole for the center-drill and put radially a set-screw.

In operation, the "flotation-type" center-drill is held in hand, its hole against

the dead center-point and its cutting point against the workpiece, where a small center hole has been practiced previously in occasion of the face-turning. The feeding of the drill is effectuated by means of the tailstock-wheel.

Plastic mill fixture for milling odd-shaped pieces

By John Innes

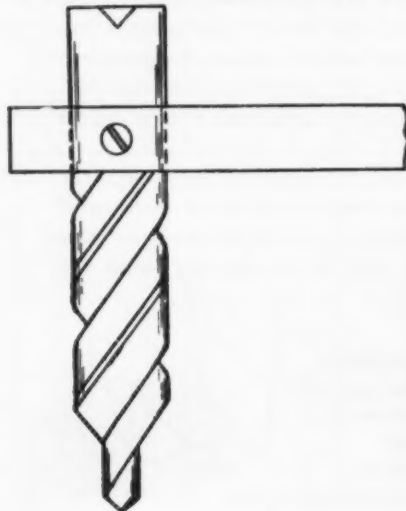
Use of a plastic mill fixture to hold, by vacuum, odd-shaped pieces for milling has enabled Chance Vought Aircraft, Inc., to do a faster, less expensive job of machining.

The aircraft industry requires numerous odd-shaped castings be cut, pieces which by ordinary methods would have to be set up and clamped separately. Chance Vought's plastic shop in Dallas, Texas, cast a phenolic resin block for the piece to be milled.

The center portion of the block was cast using a production part as a pattern, and a vacuum hose attached to a steel lead-in pipe in the lower portion of the block. Standard O-rings are cast in place to provide a seal. Original set up time for this type of fixture was about 20 minutes for one particular casting. Subsequent parts required only six seconds to place in the vacuum holding fixture.

The fixture was clamped on the bed of the milling machine. Tests indicated the vacuum block most suitable for climb milling. Up to 50 per cent savings over conventional mill fixtures was claimed for the idea, which requires no tool design.

Vacuum clamping cast phenolic plastic block used to hold odd-shaped casting for quick milling. Suction through airline at lower left holds casting in place during milling. Another casting can be put in the mold in a few seconds.

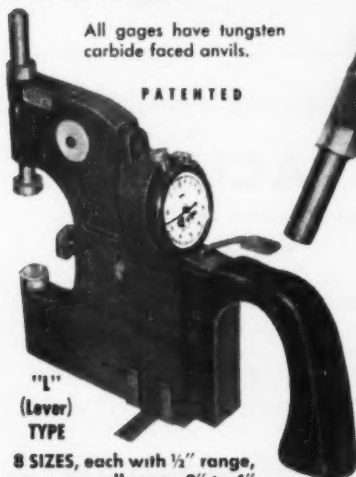


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INDICATOR POSITION permits easy entry of gage into narrow recesses. Advantageously placed for observation.

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GUARDS protect indicator and support gage when not in use.

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INSULATED GRIPS prevent hand warmth from influencing gage accuracy.

"D" (Direct) TYPE
8 SIZES, each with 1" range, cover overall range 0" to 8"

★ PARALLELISM of anvils maintained, unaffected by tightness of clamping.

★ CHOICE OF INDICATORS . . . any AGD indicator in sizes 1 or 2, with desired dial graduations.

★ TRIPLE PROTECTION; Protective indicator guards; "Capstan" sleeve acts as stop to keep gaging plunger within range of indicator, preventing distortion of indicator mounting; STANDARD's fully shockproof mechanism within indicator protects gears from damage.

★ ANVILS OVERHANG frame slightly to allow gage to be entered into narrow places and close to a shoulder.

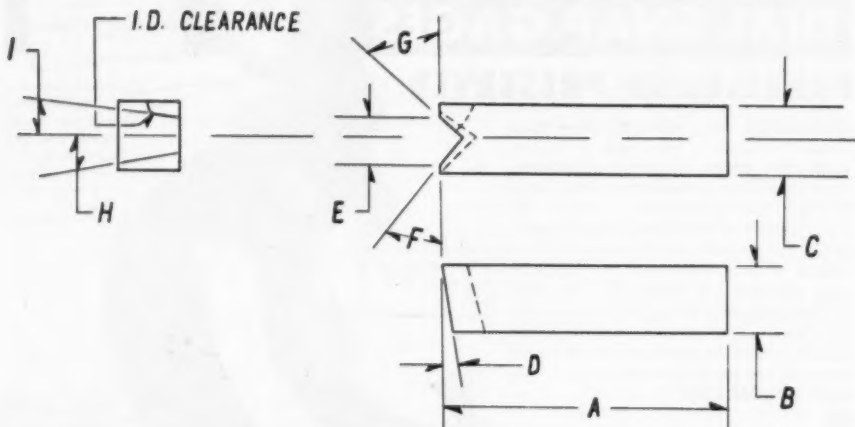
WRITE for new booklet, "NEWS", describing these and other new STANDARD developments.



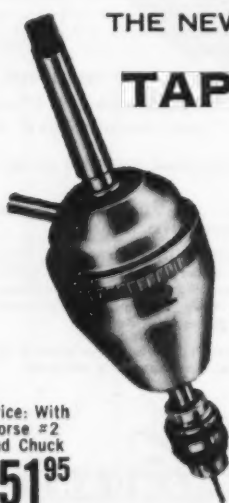
Two-in-one chamfer tool

By H. L. Rhodenbaugh

This tool will produce an inside diameter end chamfer and an outside diameter end chamfer in one pass. The two-in-one chamfer tool is shown in the illustration.



It is especially adaptable to turret lathes, and can be mounted in the square turret, and will also relieve a tool station for an added tool operation. This tool may also be mounted on the hexagon turret in the vertical slide tool holder. It is a production tool, easy to make and should pay for itself many times over.



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\$51⁹⁵

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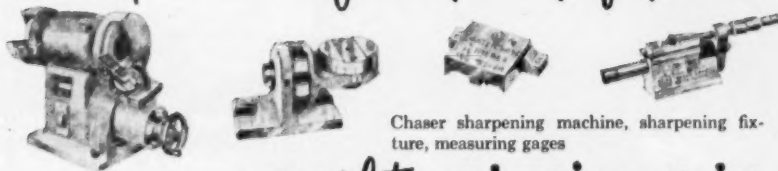
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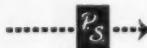


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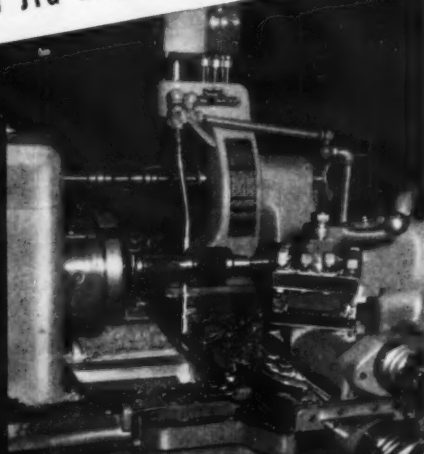
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Foremanship Forum



How Do You Measure Up to Your Foremen?

George Allison, Management Consultant
Chicago, Illinois

THE FOREMAN is, in many cases, in the dark about his company's labor, economic, and competitive problems. He has no way of knowing what management is thinking unless he is told. In some instances he is less-informed than workers around him, who are supplied with information about management from the shop steward.

This situation has been developing for years in spite of, and sometimes because of, industrial relations departments. For the most part industrial relations people are abreast of management problems and work hand-in-hand with the foreman in getting the facts across to the workers. However, some industrial relations people ignore the foreman and deal directly with the worker. Fortunately this is the exception rather than the rule. But such cases leave the foreman frustrated, and the worker with little respect for him. The worker wants somebody close to him, his boss, to fill this gap between himself and management. The foreman is best suited and qualified to carry out

the company's human relations program. His problems are on the ground-floor and that's where you'll find plant problems.

Sometime ago the National Association of Manufacturers issued a check sheet of recommended procedure in the supervisory field which it urged management to follow in order to build sound management-supervisory relations.

The 16-page booklet, issued by N.A.M., points out the dual nature of the supervisor's job, both as supervisor of production, and as leaders of the workers in his department. It also emphasizes the need for adequate and specialized training to bring the supervisory staff to maximum effectiveness, and suggests basic management policies with regard to relations between management and the supervisory staff as an industrial group. Five avenues which foremen should follow are outlined in the booklet:

1. "Instruction and training to increase the foreman's efficiency as the supervisor of his particular production group. This involves detailed instruction in such fields as":

(A) The best means of accomplishing his duties and performing his work;

(B) The methods of eliminating waste and achieving the greatest use of the manpower and womanpower and facilities under his direction;

(C) The methods of reducing accidents and safety hazards;

(D) Selection, placement and adjustment of employees, etc.

2. "Education in company policies. Administrative education to impart to foremen the general knowledge of company policies regarding":

(A) Its business operation and problems;

(B) Customer relations;

(C) Quality of products;

(D) Working conditions;

(E) Business outlook of the company;

(F) Local community relations.

3. "Human problems of employment relations. Education in the field of employment regulations so that the specific policies and regulations of the company regarding its employees and their work in the company may be thoroughly understood by foremen and, in turn, properly and soundly interpreted by them in their relations with the worker under their supervision. This education should include":

(A) A study of the written presentation of company policies and regulations;

(B) Thorough groundings in the importance of a harmonious working relationship with the rank and file employees;

(C) Emphasis on fairness in handling men and in problems that may arise;

(D) The factors that enter into the adjustment of an employee to his job, his fellow workers, and top management;

(E) The necessity for explaining any changes that may occur so that such changes meet with the full cooperation of the workers;

(F) The building and maintenance of

a spirit of loyalty and cooperation in the working group;

(G) Maintaining discipline, etc.

4. "Cost and production information. Executive information that will enable each foreman to learn the fundamentals of":

(A) How to estimate their department budgets and production schedules;

(B) Wage incentive payment plans;

(C) Job analysis and employee merit rating;

(D) The structure of costs;

(E) The care of equipment;

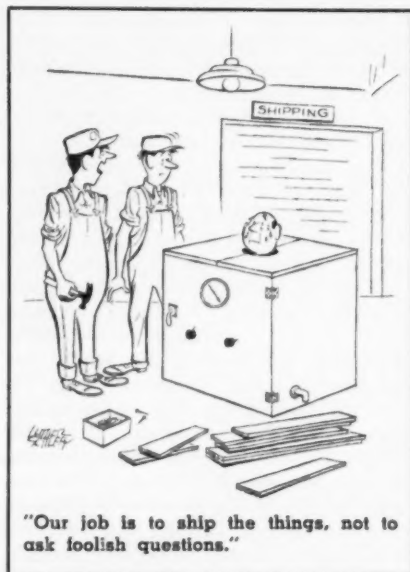
(F) Inspection and maintenance;

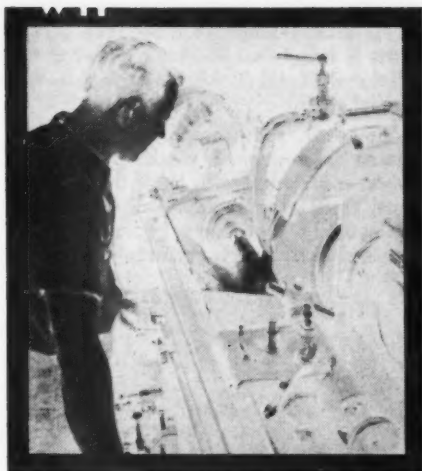
(G) Satisfactory quality and quantity.

5. "Basic information. Background information regarding the general problems affecting all business and the individual company's particular business, including such factors as":

(A) Tax problems affecting the company and the country as a whole;

(B) Government expenditures;





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Here is an achievement in precision manufacturing and quality control that will save you money and increase your production. For the CINCINNATI (PD) Manufacturing Process assures a Positive Duplication of the original wheel every time you reorder.

"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind *exactly alike*. Yet they are priced no higher than ordinary wheels.

Let us prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives—men who know

grinding and grinding machines as well as grinding wheels. Write, wire or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati, 9, Ohio.



(C) Existing and proposed legislation;
(D) Distribution of national income;
(E) Simplified business economics,
both in theory and practice, to convey
to the foreman a realistic picture of
how the business world functions and
how the individual company functions
in relation to the business world.

Foremen are the right hand of management. They must be upheld against everybody and everything that handi-

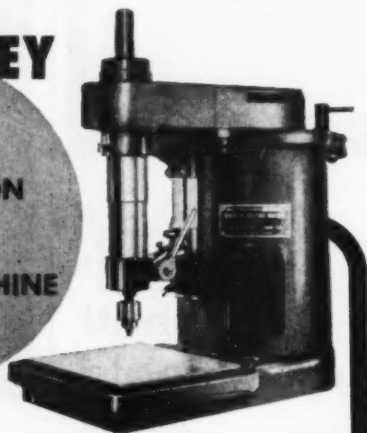
caps or makes impossible their doing their jobs. Do not let these men down. This is simply a reiteration of what the National Metal Trades Association has preached for over forty years.

However, some employers have followed a course of weak expediency; when confronted with labor union pressure and when compelled to bargain collectively they have become so engrossed with their efforts to satisfy

SIGOURNEY

M-100

the PRECISION
BENCH
DRILLING MACHINE



No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from 1/4" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.



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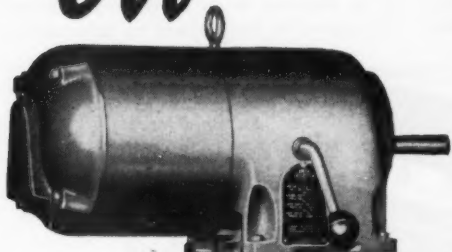
PRATT & WHITNEY

Division Niles-Bement-Pond Co., West Hartford, Connecticut

15G54

LIMA GEARSHIFT DRIVES

Offer



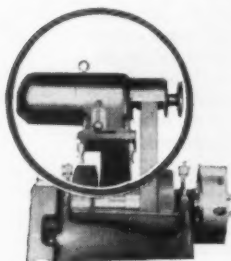
- ★ INCREASED PRODUCTION
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- ★ LOWER OPERATING COSTS

If you want to *increase* production and *reduce* operating costs—eliminate obsolete overhead lineshafting!

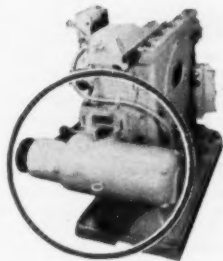
LIMA GEARSHIFT DRIVES have been designed to individually motorize all types of machine tools and production equipment — economically.

Why not let our experienced Sales Engineering Staff help solve your motorizing problems—an accurate survey of your requirements involves no obligation.

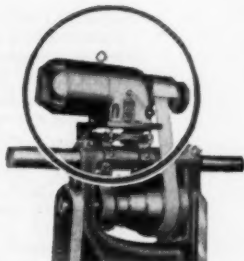
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LIMA

Coast To Coast Representation
GEARSHIFT DRIVES & MOTORS

THE LIMA ELECTRIC MOTOR COMPANY



271 Findlay Road, Lima, Ohio

labor union leaders—without too much trouble and disruption—that they have forgotten and neglected their foremen and supervisory help.

For example, the elaborate and powerful systems of labor union hierarchy set up in contracts between labor union leaders and some manufacturers have virtually made foremen and supervisors "orphans of the storm."

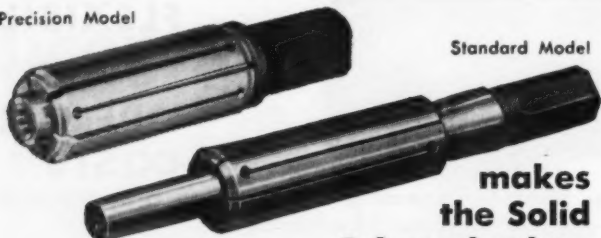
Under such contractual provisions, made without regard to their effect

upon foremen and supervisors, the foremen and supervisors become subordinated, as a matter of fact, to the labor union "stewards" and "agents" provided for in high councils of management and labor union leaders—high above the influence or even the knowledge of supervisors and foremen.

The way to drive your foremen and supervisory employees into labor unions is to deprive them of their managerial functions, to keep them in ignorance of

Precision Model

Standard Model



**makes
the Solid
Arbor obsolete**

CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

The expanding sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand—no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from 1/2" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals—from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from 1/2" to 9 1/2" diam.

CHAMPION Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.

WESTERN TOOL & MFG. CO., INC.

Our 53rd Year • Dept. 27 • Springfield, Ohio

what management and labor union leaders are doing, to build a system of super-labor union management in the plant, and to humiliate and enable others to humiliate and disrespect supervisors and foremen.

The way to hold foremen in management is to see to it that they are part and parcel of management all the time.

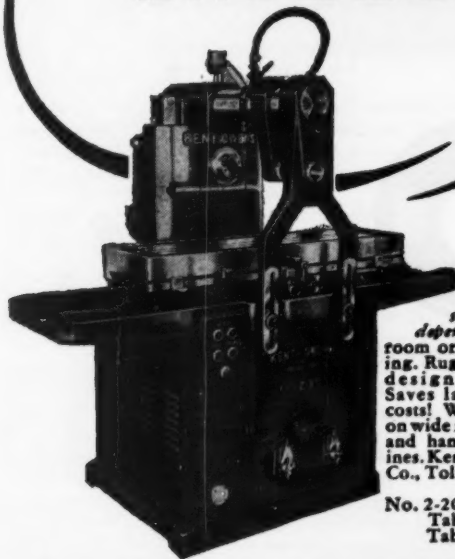
What does management expect from its foremen?

Loyalty, quality, production on time,

control of costs and accident prevention. It expects him to keep employees enthusiastic and satisfied, to know how to approach employees by having some understanding of their motives, and to know something about what makes employees do the things they do.

In addition management expects the foreman to clearly interpret company policies, give proper instructions to employees, cooperate with top management and other foremen and see that equip-

**MILL IT *faster..*
SAVE LABOR!**



Kent-Owens advanced features mean speed, accuracy and dependability... in tool room or production milling. Rugged... simple in design and operation. Saves labor... reduces costs! Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 Milling Machine
Table, 42" x 12"
Table travel, 20"

KENT-OWENS
Milling Machines

ment and tools are used properly. It expects him to handle grievances understandingly and promptly and to know federal and state labor laws as an aid in getting along with employees and to keep them informed.

Therefore, it is quite natural that a foreman feels hurt and bewildered when management by-passes him in industrial relations because he realizes such action on the part of management

injures his prestige and undermines discipline.

What does your foreman want from you? He wants notification before a policy is put into effect. He wants support of his decisions, no matter how trivial. He expects to be kept informed and to be treated as an individual. And he demands, and deserves, fair pay, a chance to get ahead on merit, clear cut instructions and no "buck passing."

18% BIGGER BARREL

✂ ✂ Gives Faster, Easier, More Accurate Measurements



There's more space between graduations making it easier to estimate fractions of thousandths. There are longer graduation lines and the rapid reading figures marking each thousandth are larger. Non-glare Chrome-Clad satin finish on the

barrel gives you easy reading even in poor light. Lufkin micrometers are easiest to adjust, too — the reading line keeps its original position directly in line of vision and the thimble doesn't cover measurements on the hub.

New **LUFKIN** Big Barrel Micrometers

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*Cross Tool Control Unit
Automatically Stops
Machine When Tools
Need Changing*

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The Cross Tool Control Unit reduces tool costs, decreases machine downtime. Available in four different sizes, it can be used with most types of metalworking equipment.

Here's what it does:

- ★ Provides continuous picture of used and unused tool life and establishes performance standards.
- ★ Decreases downtime by permitting tool changing in groups.
- ★ Reduces scrap by stopping machine before tools lose size.
- ★ Reduces tool grinding costs.

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DETROIT 7, MICHIGAN

CO.

Special MACHINE TOOLS

He expects impartiality, praise and constructive criticism, understanding of his problems, a sympathetic attitude and to be made answerable to as few men as possible with clear-cut lines of authority.

Management can develop capable foremen if it follows the principle that all parties to an industrial unit, man-

agement, foremen, and workers are human beings, and that the greatest desire in the hearts of these people is to be appreciated, understood, and recognized; and that the only sound industrial relations policy is one which is fundamentally based upon the recognition of this desire for understanding and upon treating workers and management alike.

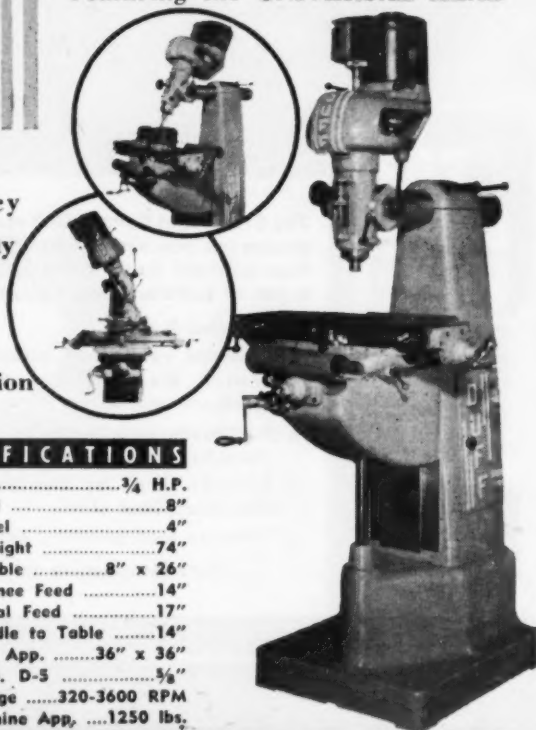
The End



The 1954 DUFF VERTICAL MILLING MACHINE

Featuring the UNIVERSAL HEAD

for
accuracy
and
versatility
in
the
tool
room
or
in
production



SPECIFICATIONS

Motor	3/4 H.P.
Cross Feed	8"
Quill Travel	4"
Overall Height	74"
Size of Table	8" x 26"
Vertical Knee Feed	14"
Longitudinal Feed	17"
Max. Spindle to Table	14"
Floor Area App.	36" x 36"
Collet Cap. D-5	5/8"
Speed Range	320-3600 RPM
Wgt. Machine App.	1250 lbs.

DUFF MACHINE COMPANY
31 Wingate St. Haverhill, Mass.



IMPROVED!
GISHOLT type "S"
Balancers

still simpler operation
with fewer controls... easier readings

Yes, we've made it possible for you to handle all balancing faster and easier than ever before.

On these improved Type "S" Balancing Machines you have but two operating controls, one for indication of amount and location of required correction in each plane. Amount and location of correction are shown simultaneously—on a uniformly gradu-

ated scale with large, easy-reading pointer and dial.

These are a few of the new features which years of broad production and maintenance experience have proved desirable. And Gisholt, always first in balancing, is first again to bring you new standards of performance.

The improved DYNETRIC Type "S" Balancing Machines are offered in both horizontal and vertical models, capable of balancing workpieces ranging from a few ounces to several hundred pounds.

Why not get complete details?

GISHOLT
MACHINE COMPANY

Madison 10, Wisconsin

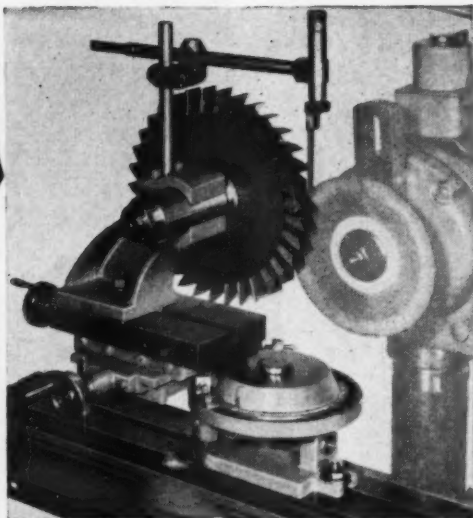


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THE UNIVERSAL RADIAL CUTTER GRINDING FIXTURE

Does 5 Operations without removing cutter from its ARBOR!

On cutters up to 8" in diameter, the No. 6 fixture, as shown with our No. 6A heavy-duty, right-angle, ballbearing spindle workhead: Sharpens side teeth on **both** sides. Sharpens peripheral teeth. Generates small or large radii on **both** corners of each tooth. (Other workheads available)



▲ THESE DEPENDABLE GRINDING FIXTURES SAVE THE LIFE OF YOUR CUTTERS. Write for our catalog 602



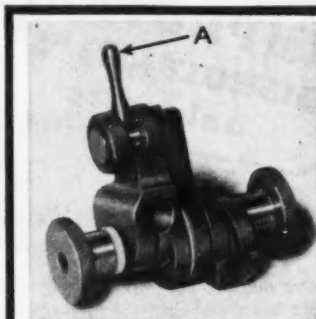
Radial Grinding Attachment D combines with Unit 1A for sharpening end mills with square, conical, or ball nose shapes. ▼



▲ UNIT 1A
This Universal Cutter Grinding Fixture fits any universal tool or surface grinder.



▲ UNIT 4A
Radial Grinding Fixture for sharpening fluted end mills with square, conical, or ball-nose mills. The index disc provides for multi-flute cutters.



▲ NEW FINE-ADJUSTMENT SLIDING SWIVEL GIVES SMOOTH, PRECISE INDICATOR SETTING. Smooth, positive positioning of finest dial indicator is readily accomplished by the fine-adjustment Sliding Swivel. Final precise positioning is accurately made by slight movement of convenient lever "A".
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SLIDING SWIVEL FOLDER

ROCHELEAU TOOL & DIE CO.
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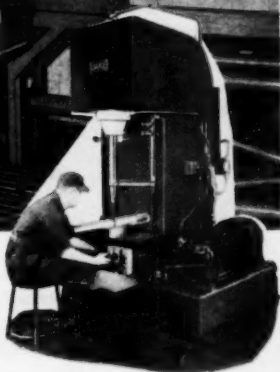
How to Straighten Flap Tracks

Precision parts for aircraft call for the use of precision equipment.

These flap tracks, machined from 4130 steel (aircraft quality), must be checked on a straightening press four times during fabrication. For ease of control and accuracy, the work is done on Dake Gap Type

Presses like that shown in the photograph above.

To the right of the ram, the operator has placed a rule gauge which indicates ram travel. Knowing the elasticity of the piece being tested, he can estimate the overtravel necessary to straighten the piece with a single movement of the ram.



*Dake Gap Type Press
broaches boring bars*

Dake Gap Type Presses are available for straightening or forcing, in 22 models ranging up to 300 tons capacity. They are fully described in Bulletin No. 299—sent on request.

Dake Engine Company, 608 Seventh St., Grand Haven, Mich.

**DAKE
PRESSES**



Arbor
Presses



Hand-Operated
Hydraulic



Power-Operated
Hydraulic



Guided
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Gap Type
Presses



Portable
Frame

FORMED COMPLETE-AUTOMATICALLY!

NILSON FOUR-SLIDES

**Combine Operations to Lower Costs
on Metal Stampings.**

STRAIGHTEN

FEED

BLANK

SWAGE

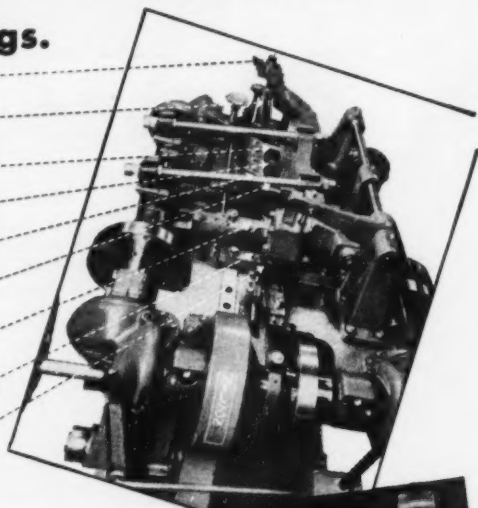
STAMP

COIN

CUT-OFF

FORM

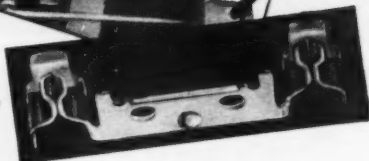
STRIP-OFF



ONE Nilson 4-Slide with ONE operator forms parts *faster*, more *accurately* with less rejects than with conventional presses.

Elimination of secondary handling, lower tooling and set up costs *means added profits*. Wide range of models for wire and ribbon metals. Feed lengths to 32", stock widths to 3½". Press capacity to 75 tons.

For specific recommendations — send details of your operation.



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Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and
Stock Beds • Fuel Presses • Wire Straightening Equipment • Slide Pads for Presses

**A special report
by the editors of
MACHINE and TOOL
BLUE BOOK**

Report number 42

Presses . . . part 4

This is the forty-second in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on presses are:

1. Studebaker Cuts Costs by Drawing and Wrapping Fenders
2. Descriptions of late model presses.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling Machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw Machines; 8. MAPI Replacement Formula; 9, 10. Chucking Machines, Turret Lathes, Hand Screw Machines; 11. Broaching Machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear Making Machines; 18, 19. Boring Machines; 20, 21, 22, 23, 24, 25, 26. Drilling Machines; 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38. Grinding Machines; 39, 40, 41, Presses.

Studebaker Cuts Costs by Drawing and Wrapping Fenders

By **Wm. R. Myers**
Press Room Superintendent
Studebaker Corp.

At Studebaker, as in every large metalworking plant where press working operations are performed, final metal finishing costs are important. Drawing and wrapping our fenders save us considerable metal finishing costs over the previous costly method of drawing, folding and welding. On the rear fender there is no metal finishing; the front fender cost has been reduced over 35%, with further economies in sight. Dies must be so designed that the finished stamping can be cleaned and

painted with only minor previous metal finishing.

Our front fender line is of particular interest because it is a change from a previous method. We used to make the front fender out of a cone. This meant butt welding and a large metal finishing line, as well as additional manpower on the welding operations; furthermore, we used more stock with the old method. Figure 1 shows the difference in methods. The two pieces on the right represent the old method; the

piece part is in the foreground, with its blank in the rear. This was a draw and fold job. Note the fold in the piece part where an eventual welding operation had to be performed. The line in the blank on the right is the size of the current blank. It was drawn over the old blank to show the saving in material. The new blank is on the left with the piece part directly in front of it. In the left foreground is the finished front fender.

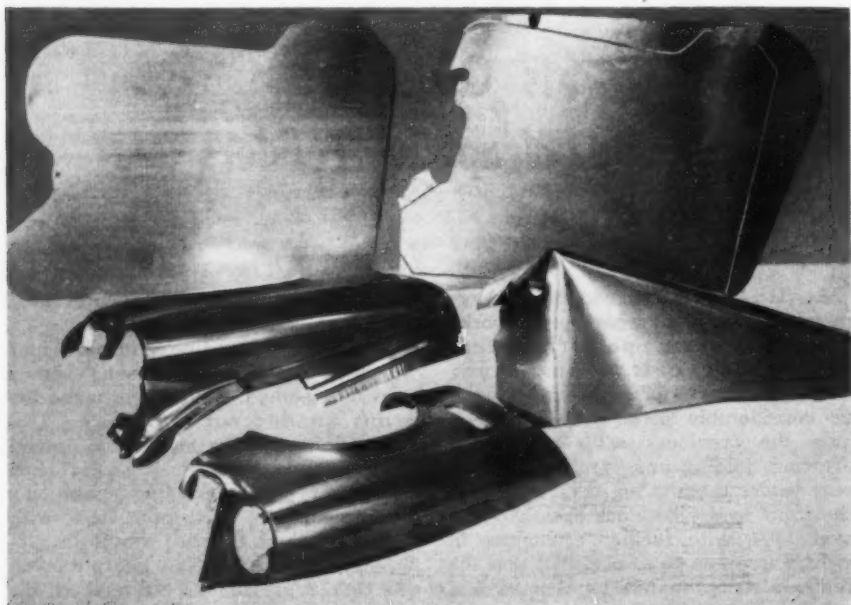
We had a large amount of scrap with the old method; when added to the additional stock cost, this amounted to quite an expense. With the new method we merely crimp weld, a fast operation.

Rim steel is used for making the fenders. We have less than 2% scrap,

which we do not think too bad at all. Rim steel, as is well known, always presents a work hardening problem. It is impossible to buy large quantities and store it because after several months you don't have the same kind of steel you bought originally. After about 42 days the steel changes. On tests we've made we found elongation at time of purchase to be 37%, 42 days later it was 31%. Hardness of rim steel increased five points in 31 days. It can be appreciated that this presents a problem on drawing operations.

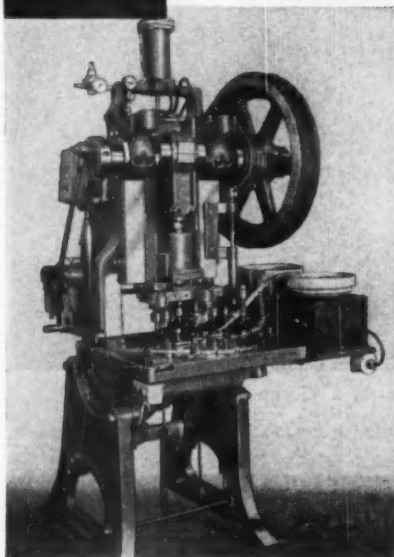
We had some rim steel and stored it for well over a year. At the end of a year we used the material and found no visible distortion; it may be assumed that the metal reverted to its original properties after the initial, and usual,

1. The blank and front fender as made by the old method are on the right. On the left are the blank, drawn piece part and the finished fender. The white line in the blank on the right compares the difference in metal used with the old method and the new draw and wrap method.





BUILT FOR AUTOMATION



V & O presses are built to machine tool standards. They provide the accuracies essential to profitable use of extensive tooling. And this high precision is maintained on job after job. The famous V & O long slide assures true alignment throughout the operating stroke.

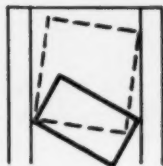
If you want to do more and get more out of a press, specify V & O. We have been automating our presses for 65 years. Our new booklet will give you the complete story.



By taking advantage of long slide precision complicated dies can be fed from two or more synchronized hoppers.

WHY THE V&O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.



THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889





2. The drawing die for the first operation. Press is a 450-ton Clearing.

3. Front fender after the first operation. The nose trimming operation takes place in the upper left of the illustration.



140 *NEW* MODELS

to Meet Every Quality Control Requirement



Starrett

HIGH PRECISION — LOW FRICTION

DIAL INDICATORS

In this *new* line of dial indicators, Starrett offers you a *truly complete* selection . . . 140 models to meet every need. Consider the advantages of buying *all* dial indicators from one reliable source . . . uniform standards of precision; simplified purchasing; greater accuracy, sensitivity and durability in all dial indicators through new *high precision* — *low friction* design . . . plus less upkeep and minimum maintenance through simplified unit construction and interchangeable parts. Get the whole story on this *complete new* line of Starrett Dial Indicators. Send the coupon today for information on *New Starrett Dial*

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Precision built throughout to American Gage Design specifications, these *new* Starrett Dial Indicators are available in *Regular* or *NON-SHOCK* types, with balanced or continuous dials, jeweled or plain (inserted bronze) bearings, English or Metric graduations . . . in all four standard A.G.D. groups plus a complete series of *long range* models.

Send the **Coupon Today** for information on Starrett *High Precision* — *Low Friction* Dial Indicators.

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Athol, Massachusetts

Please send information on Starrett *High Precision* — *Low Friction* Dial Indicators.

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"WORLD'S GREATEST TOOLMAKERS"



MEASURING AND MEASUREMENT TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES
PRECISION GRINDING FLAT STOCK • HACKSAWS, BAND SAWS and BAND KNIVES
THE L. S. STARRETT COMPANY, ATHOL, MASSACHUSETTS, U. S. A.

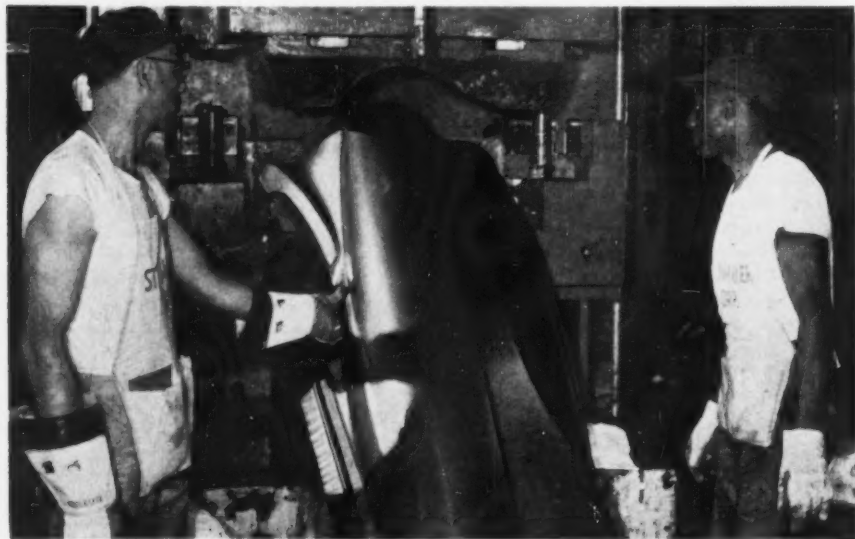
distortion. Neither the metallurgical department, nor the steel companies, see eye to eye with us on this example; but then, there is much that is unknown about the behavior of metals.

In drawing operations there are considerable compression and tension forces, as well as extensive plastic flow. Depending on the type of drawing operation, primarily in cupping operations, there is a violent rearrangement of metal crystals. It may be said that in stamping operations the metal is forced where you want it to go while in drawing you direct the metal. We always scribe our blanks before going ahead with a job. In this way we know where the metal is going, to what extent, and whether it is going to the right place. The blank is scribed in one inch squares and inserted in the press. By knowing where the metal will flow we can bead the die accordingly; the metal movement can be easily checked by the scribe marks.

The dies for fenders and similar large

objects are more complicated than simple drawing dies. Much of the secret of success of making large dies lies in accurate control of metal flow forces. This is usually done by a blank holder on the die drawing the metal and sufficient beads to retard the flow of metal while a punch pulls the stock into the die. Beading is particularly important. We make them of cold rolled steel and anchor them in the die by means of drilled and tapped holes, then screwing them to the bottom of the die. If the beads are not correctly positioned wrinkling occurs (wrinkling occurs, of course, also through too fast a metal flow); thus, beads are moved about until just the right metal flow is obtained. The metal flow is aided by the use of lubrication. While there are many fine lubricating and drawing compounds on the market we have stuck to plain oil, finding that no buck shot resulted from oil. The use of lubrication is very important, aiding in the metal flow. This flow can be controlled to some extent

4. Forming operation for the headlamp and grill opening.



*Now you can buy
a press brake like this
"off the shelf" for \$1455*



**Verson now offers standard brakes
with immediate delivery from stock**

Any shop where metal is bent can now take advantage of a new convenient way of buying quality all steel press brakes. There's no need for involved proposals or a long wait for delivery. You can now buy Verson No. 16-48 and No. 1062 brakes as easily as buying a car. Prices are published publicly and delivery of standard models is made from stock.

Write for spec sheets on either model and then place your order.

A Verson Press for every job from 60 tons up.



ORIGINATORS AND PIONEERS OF ALL-STEEL STAMPING PRESS CONSTRUCTION

VERSON ALL-STEEL PRESS CO.

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MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES



5. The wrapping operation. By turning the photo upside down one can see how the fender was drawn in the first operation.

6. The completed wrapping operation.





Save time in gaging large dimensions with this Ellstrom "Build-Up" Set!

What a time-saver this Ellstrom "Build-Up" Set is when it comes to checking large dimensions to millionths of an inch accuracy! Six round gage blocks from one to six inches, plus a standard base one inch high. Just select the right combination of blocks, wring them together on the 4" dia. base. Then add standard gage blocks to establish the exact decimal dimensions desired! It's quick, easy, accurate . . . with far less chance of error, and none of the normal hazards encountered in building up large combina-

tions with regular gage blocks. Won't topple over . . . and if knocked over, blocks are held in combination by internal locking screws. Ideal for surface plate checking, setting visual gages or amplifiers, as well as for checking work on planers and horizontal boring mills. And each block is backed by the traditional heritage of Ellstrom . . . measuring in millionths for three generations.

New fact-filled catalog contains complete information on the entire Ellstrom Standards line. Send for it today!



ELLSTROM STANDARDS DIVISION

Dearborn Gage Company • 22035 Beech Street • Dearborn, Michigan

Originators of Chromium Plated Gage Blocks



by the judicious use of lubrication on the die. A horn on the die pulls the metal and assists in the flow.

Presses used on the fender job are Clearings, 450 ton capacity, double-action. They are of the 4-point adjustable type, permitting adjustment at four different points. The press action is as follows: 1. Hold down; holding the blank in place; 2. ram—punch draws the metal; 3. the lifter which comes up from the bottom of the die in the press and pushes the formed metal out of the die.

Sequence of Press Operations

1. Blank rim steel, 19 gauge.
2. Drawing die for the first fender drawing operation, figure 2. A pin is attached to the die, which can be seen in the illustration. This pin inserts into the hole in the blank and prevents any

unwanted movement of the blank in the press. Notice that the nose trimming operation takes place in the left of the photograph. No compound is used on the dies, merely oil, which we've found highly satisfactory. Figure 3 shows the fender after the first drawing operation.

3. This is the nose trim operation, (upper left-hand corner of figure 3). Here the front end of the fender, around the lamp, is trimmed. On this nose trim operation we also make a small notch so that when the final fold is made there is no excess metal. Figure 7 shows this small notch, indicated by an arrow. It looks like a scratch. Sometimes it is necessary to perform a welding operation here; sometimes welding can be eliminated. The piece part is inserted from the rear.

4. A forming operation for the head lamp and grill opening. A horn has been

7. Restriking the fold line. On this operation the crease, or ridge, which is made when the piece was first drawn, is removed."

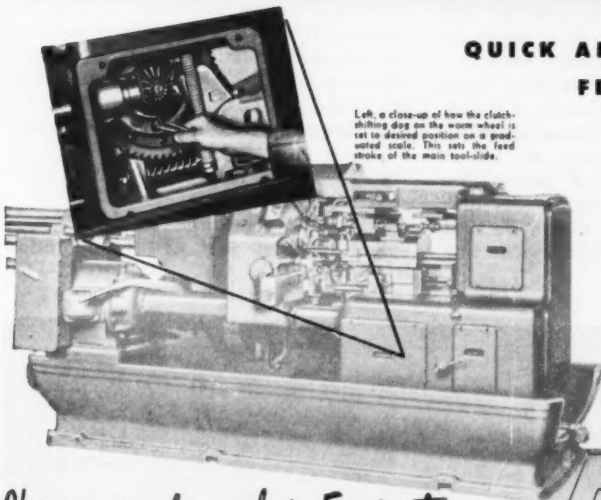


GREENLEE

Automatic

QUICK AND EASY FEED STROKE

ADJUSTMENT

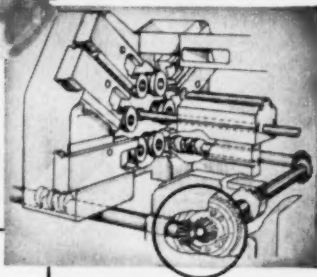


Left, a close-up of how the clutch-shifting dog on the worm wheel is set to desired position on a graduated scale. This sets the feed stroke of the main tool-slide.

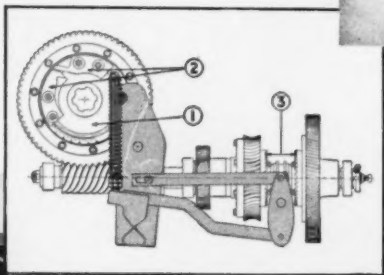
On Greenlee Automatics, main tool-slide feed stroke adjustments are made by adjusting only one dog on a graduated worm wheel, as illustrated by the inset picture at the left. The details of this arrangement, and particularly the relation of the worm wheel to the main tool-slide drive, are shown and explained in the other pictures and captions.

Changes can be made in 5 minutes

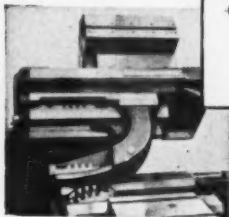
Precise adjustments of the main tool-slide stroke can be made easily in less than five minutes. To save time in making preliminary settings, two additional scales are provided, one on each side of the tool-slide, with graduations corresponding to those on the worm wheel.



The drawing at the right shows how the clutch, worm and worm wheel, and clutch shifting levers are related. Numbers indicate: (1) the graduated worm wheel; (2) the clutch shifting dogs; and (3) the main drive clutch.



The cutaway diagram above shows, in the circle, the location of the graduated worm wheel on the end of the shaft that carries the intermittent feed gear.



At the left is a view of the tool-slide removed and tilted back. The intermittent feed gear provides a full stroke each cycle, with fast approach and a smooth shift into feed. The main clutch is shifted automatically.

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PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1840 MASON AVE., ROCKFORD, ILL.

put in the draw die, figure 4.

5. Figures 5 and 6 show the wrapping operation and the fender after wrapping. By turning the photo upside down a good idea can be gained of how the fender was drawn in the first operation.

6. Finishes the wrapping operation.

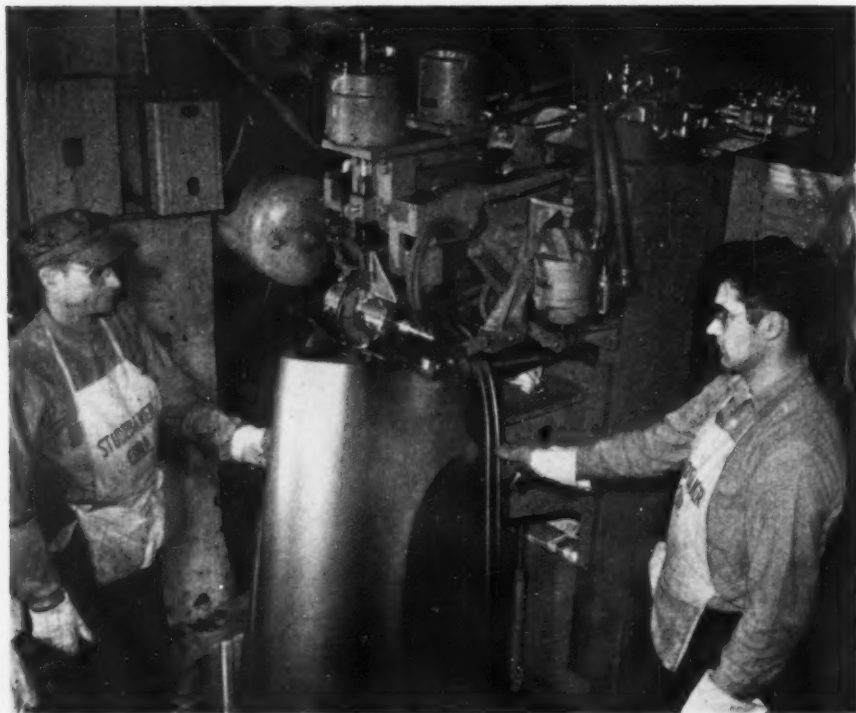
7. Restrike fold line, figure 7. This is the operation which completes the wrap-around operation. If a piece of paper is folded and then opened a crease results. This is exactly what happens in drawing the fender, a crease line results from the initial drawing operation. With every draw we had a line. As with the piece of paper—the paper can be folded in such a way that the crease is either up or down. We first worked out a method whereby the line

was up, but a ridge developed which we couldn't eliminate. We then arranged the operation so that the line would be down. This was satisfactory, and we've had no trouble with the wrapping at all. This operation, or rather, the down crease, can be seen quite plainly in figure 5. The line visible in figure 7, extending across the entire side of the fender, is a design line which will not be removed in subsequent operations. The case which has been removed is at the same spot as the small notch which was formed in the second operation and which is indicated by an arrow.

8. The front fender is welded on a seam welder, figure 8.

The eight operations just mentioned constitute that part of the operation

8. Seam welding the front fender around the headlamp.



which is primarily concerned with the draw and wrap operation. The remaining operations are standard and need no further emphasis; they are as follows:

9. Trim over-all fender. Cut out side opening for side door vent.

10. Flange all around.

11. Flange vent door opening.

12. Restrike headlamp and grill opening.

13. Flanging hood light.

14. Pierce holes in grill opening.

15. Trim, restrike headlamp opening and pierce.

16. Tack in reinforcement for door light on fender.

17. 45 and flat.

18. Spot weld door line reinforcement.

The End.

Descriptions of late model machines

Henry & Wright dieing machine

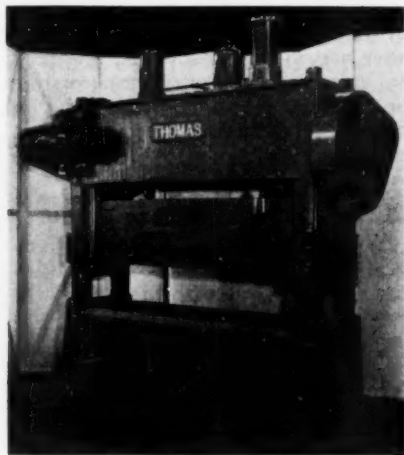
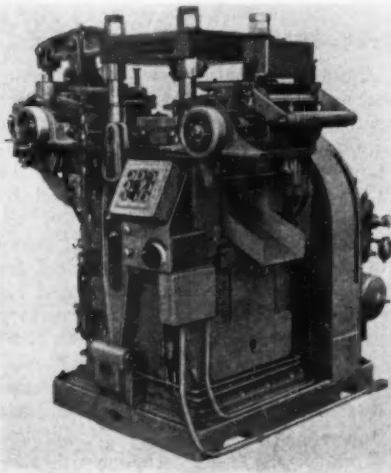
The design of Henry & Wright Dieing Machine, product of Henry & Wright Div., Emhart Mfg. Co. Hartford, Conn., differs radically from other presses in that the actuating mechanism, comprising the flywheel, clutch, crankshaft, connection and lower crosshead, is located below the die bed.

This provides a lower center of gravity permitting higher operation speeds with minimum vibration; a large area of guiding surface, including a four-post guide to upper crosshead insuring precision alignment of punch and die throughout the stroke; upper crosshead

receives only pressure necessary to perform work in the die; a pulling stroke is applied to the stroke instead of a pushing stroke; design provides unobstructed view of tools from all sides; machined surfaces on all four sides of die bed and upper crosshead simplify design and installation of special and tool attachments; and reduced setup time for dies, feeds and stacking chutes.

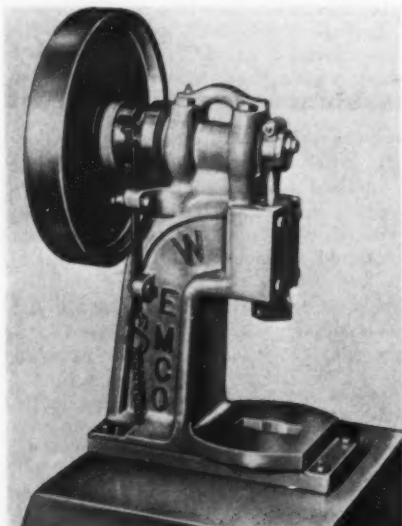
Double crank straight side machine

Built for heavy and large pressing operations, the Thomas Machine Manufacturing Co., Pittsburgh, Pa., double crank straight side machine has a capacity of 75 tons and bed size of 30x96".



Emco power punch press

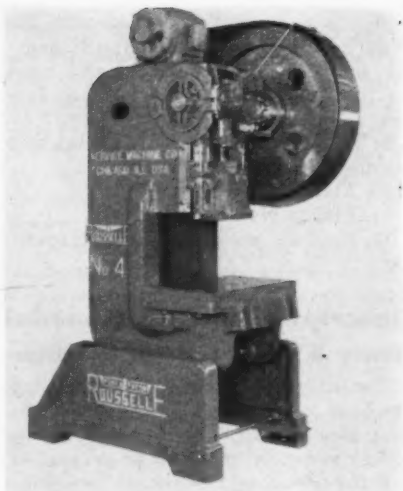
The Emco bench type punch presses, manufactured by Klaas Machine & Manufacturing Co., 4314 E. 49th St., Cleveland, Ohio, will provide up to 18,000 operations per hour on the Emco "W" and 9,000 operations per hour on the Emco "X". They are popular for jobs such as forming, stenciling and



riveting. In addition to metal working uses, these presses perform operations involving rubber, leather, plastics and other non-metallic materials. The normal speed is five strokes per second on the "W" and 2½ strokes per second on the "X". Added features include a cam carried by the crank affords a ½" adjustment without special shimming.

40-ton OBI Press

The new 40-ton OBI Rouselle punch press, manufactured by Service Machine Co., 7627 S. Ashland Ave., Chicago, requires little maintenance over long-period of operation. The press, shown here, features oversize clutch mechanism, roller bearing flywheel, replaceable bearings, automatic knockout and single stroke attachment.



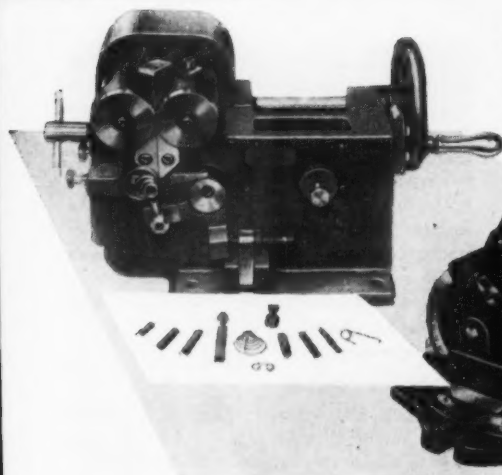
Other features include: extra heavy frame, replaceable bearings and oversize clutch mechanism that can be set for single stroke or continuous operation. The No. 3 and No. 2 models, in addition, come equipped with roller bearing flywheels and special roller bearing inclinable devices.

Models No. 1A and 0A are also available in bench models.

Press-Rite press model No. 00

A new press with a two-ton capacity and designed to eliminate the fatiguing operation of "kick presses" and also eliminate manual punching and assembling operations has been added to the Press-Rite Press line, represented by Sales Service Machine Tool Co., St. Paul, Minn. The press is made of heavy duty construction, making it ideal for small stamping. It is also designed for the jewelry trade and for secondary or assembly operation.

A single trip safety mechanism is provided as standard equipment, and this may be quickly changed to continuous operation. Heavy duty inclinable frame, gib adjustments on both sides, bronze



Hand-operated model for tool-rooms, maintenance work or research labs. Approved and used by the Armed Services.



Only 7" high (lowest in the trade), **OMNI-VISE #4**, shown here, is tough, weighs 74 lbs. Jaws are 4" x 1 1/2", open to 4". Base is 9" in diameter one side straight.

new slant on shop profits!

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of

arbors, yet turn out precision springs — torsion, compression, extension tapered, or special springs — coiled either left or right hand, in any desired length, any diameter from 1/16" to 12" and larger, with or without initial tension, and with open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. Make them fast right in your own shop!



Power model for continuous runs, on welded steel console base.

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Accurately set in all three planes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only 7" high (lowest in the trade), **OMNI-VISE #4**, shown at top, is tough, weighs 74 lbs. Jaws are 4" x 1 1/2", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE #2**, a precision low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height, 4 3/4". Jaws, 2 1/8". Opening, 2 1/8". Base, 7 1/4" x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.

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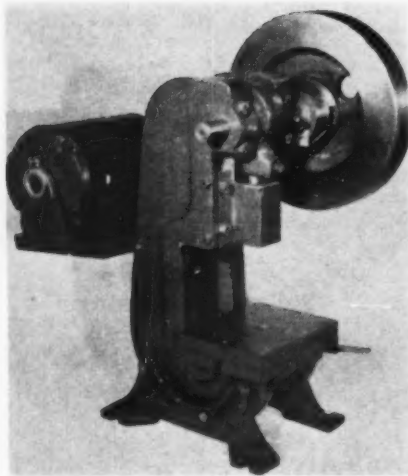
OMNI-VISE #4 ☐ **#2** ☐

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Company _____

Address _____

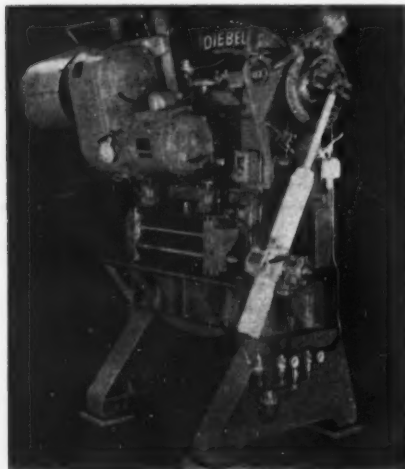
City _____ State _____



wear strips in ramway, bronze bushed flywheel and main bearings and connecting rod are standard features.

40-Ton automatic press

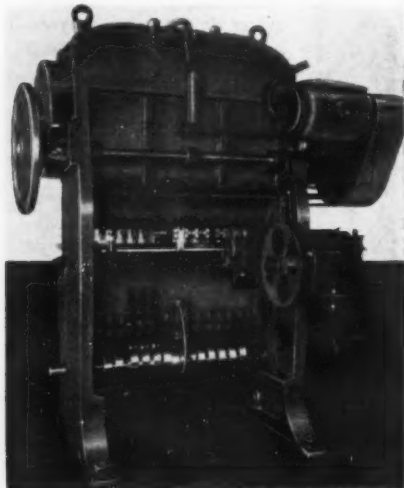
The 40-ton Diebel automatic press No. 28, a product of Di Machine Corp., 2711 W. Irving Park Rd., Chicago 18, Ill., offers some reduction in labor costs while increasing stamping production.

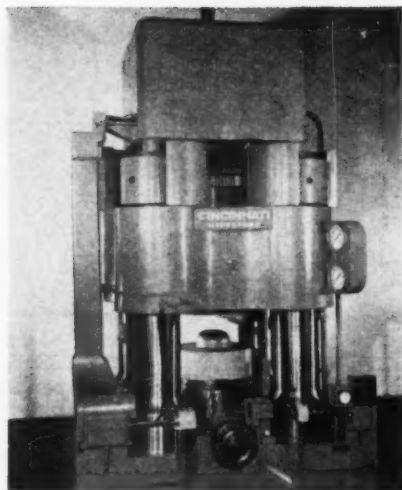


The model shown here features Fawick Airflex clutch and brake; crankshaft supported in four bronze bearings; slide 16-inch diameter, shaped cylindrically; roll feeds, air clamped; scrap cutter, reversible cutting blades; morse-form-sprag over-running clutch for accurate feeding; air valve and adjustable cam operates roll feeds; shock absorbers reduce vibration, noise and die shock; and air controls, filter, lubricator and pressure regulator.

Transfer press

Human-like transfer fingers grip and carry work to progressive die stations where blanking, drawing, piercing, embossing, slitting, trimming, sizing, hexing, forming, etc., complete the piece on Baird Machine Co., Stratford, Conn., automatic transfer press. This press can turn out accurately-formed pieces at a rate of 1,000 per hour while performing 14 operations on each piece. There are 12 standard machines which have rated working pressures from 5 to 55 tons. Coiled stock from 2½" to 4" in width is automatically fed in feed lengths from 2" to 3½".





Hydroform machine

The principle of hydroforming is a new method of deep drawing simple or intricate shapes in all kinds of sheet metal. The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, Hydroform shown here is a 32" model. The flexible die member eliminates the need for matching dies. Hydraulic fluid is substituted for steel dies. As a result, fewer drawing operations and anneals are required to form either simple or intricate shapes since most parts can be formed in a single continuous operation.

Tools consist of a simple draw ring and a punch made in the shape of the part being formed. The built-in flexible die member serves as a universal die. Tools require no fastening, and are self-centering, easy to locate.

Specifications of American built presses

Service Machine Co.		Chicago 22, Ill.		
Type and Model	C=Capacity (tons) D=Depth of Throat	A=Area of Bed O=Opening in Bed	Shut Height	Stroke (Standard)
Horning Press				
5H	C=5	A=7" x 10½" O=4" dia.	4" min.; 10" max. 5½" min.; 13" max.	1¼"
15H	C=15	A=11" x 16" O=6"	5½" min.; 13" max.	2"
25H	C=25	A=14" x 20" O=8"	6" min.; 17" max.	do
Deep Throat Press				
0G	C=5; D=12"	A=7" x 10½" O=5" round; 4" x 6" rect.	6½"	1¼"
2G	C=15; D=18"	A=11" x 16" O=8" round; 6" x 10" rect.	7¾"	2"
3G	C=25; D=18"	A=14" x 20" O=8" round; 7" x 12" rect.	10½"	do
O.B.I.				
0A	C=5; D=3½"	A=7" x 10½" O=3"	4¾"	1¼"
1A	C=10; D=4"	A=8" x 12" O=4"	6¾"	2"
2	C=15; D=5½"	A=11" x 16" O=5½"	7¾"	do
3	C=25; D=7"	A=14" x 20" O=7"	10½"	do
Double Crank Gap Press				
4-W	C=40; Width Opening through back, 37"; Area of ram, 9" x 36"	A=14" x 48" O=8" x 36"	5½" min.; 18½" max.	do

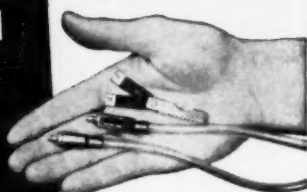
Di Machine Corp.
Chicago 18, Ill.

Type and Model	W=Width Between Uprights C=Capacity, Tons D=Die Set Capacity	Crankshaft Dimensions	A=Area of Bed O=Opening in Bed	SH=Shut Height ST=Stroke, Std.
Automatic Presses				
5 ton	C=5 D=4" wide x 8" long	1½"—1¾"	A=9¾" x 7" O=2½" x 4"	SH=5¼" ST=¾"
8 ton	C=8 D=6" wide x 8" long	1¾"—2"	A=12½" x 5½" O=4½" x 5½"	SH=6" ST=1" or 1½"
12 ton	C=12 D=6" wide x 8" long	1¾"—2¼"	A=12" x 9" O=5" x 6¼"	SH=6" ST=1", 1½" and 2" max.
40 ton	C=40; W=19" 8" width of feed rolls; 11" feed length	3¾"	A=22½" x 18" bolster plate O=9" x 14" x 12" dia.	SH=7¼" ST=1"—1½" 2"—2½"
28"	C=40 tons; W=28"; 23" width of feed rolls; 13" length of feed	3¾"—4¼"	A=22" x 27½" bolster plate O=9" x 24" x 12"	SH=7¼" ST=2½" max.
19"	C=40 tons; W=19"; 14" width of feed rolls; 13" length of feed	do	A=22" x 18" bolster plate O=9" x 16½" x 12"	do
60 ton	C=60 ton; W=28"; 10" width of feed rolls; 11" length of feed	4¼"—5"	A=22½" x 27½" bolster plate O=6" x 24" x 12"	ST=4"

Sales Service Machine Tool Co.
St. Paul, Minn.

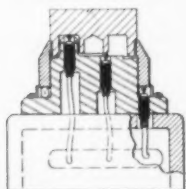
Type and Model	Capacity	Dia. Crankshaft at Main Bearing	A=Bolster Area O=Opening in Bed	SH=Shut Height ST=Stroke, Std.
O.B.I. No. 0-5	5 tons	1½"—3"	A=7" x 8½"; O=3¾" x 6¼"	SH=7"; ST=1½"
No. 1-10	10	1¾"—2½"	A=10" x 14¾"; O=5¾" x 7"	SH=7½"; ST=2"
No. 1½-15	15	2¼"—2¾"	A=10" x 14¾"; O=5¾" x 7"	SH=8"; ST=2"
No. 2-20	20	2¾"—3"	A=11" x 18"; O=6" x 7"	SH=8½"; ST=2"
No. 3-30	30	3"—4"	A=13¾" x 24½"; O=7½" x 10½"	SH=10"; ST=2½"
No. 60	60	4¼"—5¼"	A=21" x 32"; O=13" x 16½"	SH=14"; ST=4"
No. 85	85	5"—6"	A=22" x 36"; O=14" x 19"	SH=12"; ST=4"

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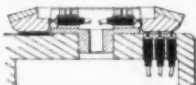


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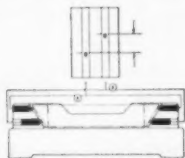
Gage Division, The Sheffield Corporation, Dayton 1, Ohio



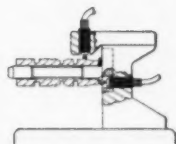
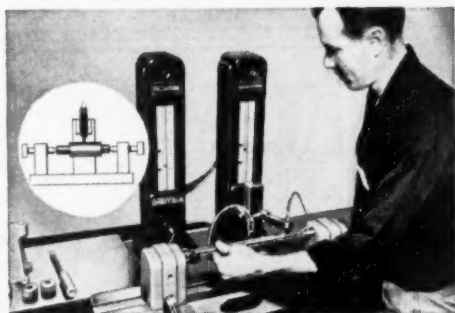
Depth and shoulder height



Inside diameter and flatness



Diameter and Taper



Concentricity and squareness

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SHEFFIELD

6721

Thomas Machine Mfg. Co.
Pittsburgh 23, Pa.

Type and Model	C=Capacity (Tons) W=Width Opening Between Gibs	D=Dia. and Length of Main Bearing C=Center Horn to Bottom of Slide	A=Area of Bed O=Opening in Bed	SH=Shut Height ST=Stroke (Std.)
O.B.I. 6A	C=56; W=12½"	D=4" x 6½"	A=20" x 28" (bolster) O=13½" x 15½"	SH=12"; ST=4"
7A	C=80; W=15"	D=4" x 8"	A=28" x 36" (bolster) O=14" x 20"	SH=15"; ST=4"
8A	C=106; W=18"	D=5½" x 9"	A=30" x 42" (bolster) O=18" x 23"	SH=14"; ST=5"
Horning Press 6HA	C=56	C=10"	A=24" x 32" (Swing knee) O=14" x 18" (knee)	SH=10½"-22½"
7HA	C=80	C=12"	A=27" x 37" (Swing knee) O=16" x 21" (knee)	SH=11"-23"
8HA	C=106	C=15"	A=30" x 43" (Swing knee) O=18" x 25" (knee)	SH=10"-24"
Straight Side 75S (5 Bed Sizes)	C=75	4"-5½" (dia. cranks shafts)	A=30" x 48", 60", 72", 84", 96" O=20" x 40", 52", 64", 76", 88"	SH=14"; ST=5"
100S (5 Bed Sizes)	C=100	5½"-6½" (dia. cranks shafts)	A=33" x 48", 60", 72", 84", 96" O=22" x 40", 52", 64", 76", 88"	SH=14½"; ST=5"
125S (5 Bed Sizes)	C=125	6"-7½" (dia. cranks shafts)	A=34" x 48", 60", 72", 84", 96" O=23" x 40", 52", 64", 76", 88"	SH=14½"; ST=6"
150S (5 Bed Sizes)	C=150	6½"-8" (dia. cranks shafts)	A=36" x 48", 60", 72", 84", 96" O=24" x 38", 50", 62", 74", 86"	SH=15"; ST=6"
200S (4 Bed Sizes)	C=200	7"-8½" (dia. cranks shafts)	A=38" x 60", 72", 84", 96" O=25" x 50", 62", 74", 86"	SH=16"; ST=6"
300S (5 Bed Sizes)	C=300	8"-9½" dia. cranks shafts)	A=40" x 60", 72", 84", 96", 120" O=26" x 50", 62", 74", 86", 110"	SH=21"; ST=8"

The Klaas Machine & Mfg. Co.
Cleveland 25, Ohio

Type and Model	C=Capacity (Tons) D=Depth of Throat	A=Area of Bed O=Opening in Bed	Shut Height	Stroke (Standard)
Power Punch Press Model W Bench type	C=5; D=3½"	A=6½" x 8½" O=2" dia.	5½" or 5¾"	¾", 1" and 1½"
Model X Bench type	C=10; D=5"	A=9" x 13" O=3" dia.	6½" or 6"	1½" and 2"

The Baird Machine Co.
Stratford, Conn.

Type and Model	Capacity (Tons)	W=Width of Metal L=Length of Feed	Width of Gate	SH=Shut Height ST=Stroke (Std)
Multiple Transfer Presses				
1-7	5	W=2½"; L=2"	7½"	SH=7.875; ST=1"
1-13	do	do	12½"	do
1-18	do	do	17½"	do
2-15	9	W=2¾"; L=2¼"	14¾"	SH=8.625; ST=1½"
2-19	do	do	18½"	do
3-12	16	W=3"; L=2½"	11½"	SH=10"; ST=2"
3-19	do	do	18½"	do
3-25	do	do	24½"	do
4-28	30	W=3½"; L=3"	27½"	SH=13"; ST=2½"
4-37	do	do	36½"	do
5-39	55	W=4"; L=3½"	38½"	SH=18"; ST=3"
5-51	do	do	50½"	do

Henry & Wright, Div. Emhart Mfg. Co.
Hartford, Conn.

Type and Model	C=Capacity (Tons) W=Width Metal Roll will Handle L=Length of Feed (Std.)	Dia. Crankshaft at Bearing and Pin	A=Area of Bed O=Opening in Bed	SH=Shut Height ST=Stroke (Std.) SP=Machine Speed (s.p.m.)
Dieing Machine				
25-Ton (Reg. and High Speed)	C=25; W=6¾" L=0"-6¾"	3" and 3" (reg.) 3" and 4½" (high speed)	A=Length of bed, 17½" O=4½"x10"	SH=8½"; ST=1½"; SP=350 reg.; 600 high speed
50-Ton (Reg. and High Speed)	C=50; W=12½" L=0"-8¾"	4½" and 5"	A=Length of bed, 28¾" O=8½"x18"	SH=11-13/16"; ST=2"; SP=300, reg.; 500, high speed
60-Ton (Reg. and High Speed)	C=60; W=12½" L=0"-8¾"	4½" and 5½"	A=Length of bed, 36" O=8½"x24"	SH=12"; ST=2"; SP=250 reg.; 475 high speed
75-Ton	C=75; W=12½" L=0"-8"	5" and 6"	A=Length of bed, 43" O=10"x28"	SH=13½"; ST=3"
100-Ton	C=100; W=12½" L=0"-8"	6" and 7"	do	do
150-Ton	C=100; W=12½" L=0"-8"	6½" and 8½"	do	SH=14"; ST=3"
175-Ton	C=175; W=14" L=0"-12½"	7" and 9"	A=60" O=12"x40"	SH=15"; ST=4"
200-Ton	C=200; W=14" L=0"-12½"	7½" and 9½"	A=60" O=14"x40"	SH=16"; ST=4"
250-Ton	C=250; W=25" L=0"-12½"	8" and 10"	A=74" O=16"x48"	SH=18"; ST=5"
300-Ton	C=300; W=25" L=0"-12½"	9" and 11½"	do	do
350-Ton	C=350; W=25" L=0"-13"	9½" and 12"	A=85" O=18"x54"	SH=20"; ST=6"
400-Ton	C=400; W=25" L=0"-13"	10" and 12½"	do	SH=22"; ST=6"

The Cincinnati Milling Machine Co.

Cincinnati 9, Ohio

Type and Model	B=Max. Blank Diameter D=Max. Draw Depth	C=Max. Dome Cavity Pressure G=Max. Blank Gage	Max. Operating Rate (Cycles Per Hour)	Oil Capacity (Gallons)
Hydroform				
8"	B=8" D=5"	C=15,000 p.s.i.; G=1/4" steel	200	100
12"	B=12" D=7"	C=15,000 p.s.i.; G=3/8" steel	150	200
19"	B=19" D=8"	do	120	300
23"	B=23" D=8"	C=10,000 p.s.i.; G=1/2" steel	do	do
26"	B=26" D=12"	C=15,000 p.s.i.; G=3/8" steel	90	500
32"	B=32" D=12"	C=10,000 p.s.i.; G=1/2" steel	do	do

3,300 attend two-day open house at Ryerson Steel Milwaukee plant

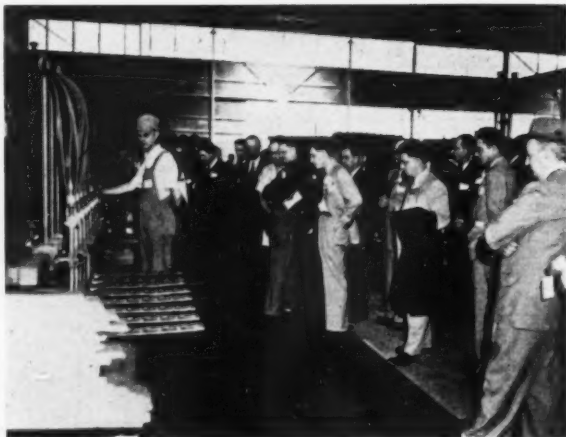
Joseph T. Ryerson & Son, Inc. recently held open house at their new plant at 500 S. 88th St., Milwaukee, Wis.

An estimated 2,500 customers and friends visited the plant the first day. They were served dinner and other refreshments in tents erected on the plant grounds. Employees and their families and residential neighbors and their families, numbering about 800, were entertained at a special luncheon the following day.

Playing the role of hosts at the open house were all of the Milwaukee plant

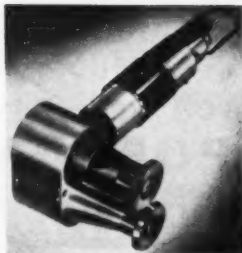
employees, headed by **Fred Kurfess**, plant manager, and **Melvin B. Monson**, assistant manager. Company officers on hand to welcome guests included **Clarence B. Randall**, chairman, **Charles L. Hardy**, president, **William Seymour, Jr.**, **Thomas Z. Hayward**, and **James M. Mead**, vice presidents, **Merle A. Miller**, treasurer and assistant secretary, and **Thomas G. Miller**, secretary. **Edward L. Ryerson**, chairman of the executive committee of Inland Steel Co., and **Everett D. Graff**, retired, former president and director of Ryerson, also attended.

Open house visitors are intrigued by the automatic operation of the electric-eye controlled multiple torch flame cutting machine in operation at the new Milwaukee steel service plant of Joseph T. Ryerson & Son, Inc.



THE "Q" LINE of HIGH Quality SPECIALIZED PNEUMATIC TOOLS

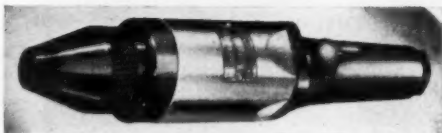
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For accuracy and speed in shearing operations, you can depend on the "Q" line of Pneumatic Trim Shears. Easy to handle . . . even on the most difficult operations. For use on steel, aluminum, stainless steel, titanium, Inconel and similar materials. Made in three models and various sizes with cutting speeds (according to type) of 8, 12 and 16 feet per minute. Write for helpful literature.

ROUTERS

Compact in design, you'll find among the 5 models, just the type pneumatic router to cut your materials . . . whether they include non-ferrous metals, phenolic resins, fiber, plexiglass, etc. Unique nose guide is adjustable for quick setting of cutter depth. Speeds 20,000 and 35,000 R.P.M. Let us tell you more about these routers to handle your particular job.



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Holding tolerances up to and including .005", the "Q" line of Router Motors is ideal for high speed routing of Aluminum (including 75 ST) and heavy gauge materials. Where controlled speed is essential, governor controlled routers are available . . . for sawing or drilling. Will not exceed designed speed. Write for full information.

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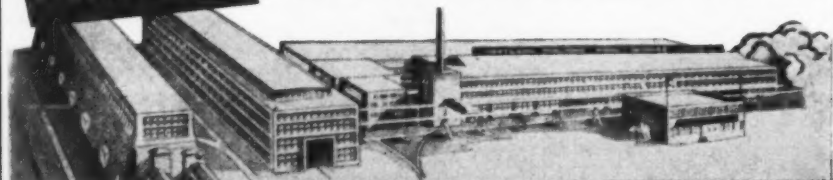
The PORTLAND milling head was especially designed and engineered to solve heavy duty milling problems . . . milling of armor plate, special alloys, etc. These heads are easily adapted to outmoded planers . . . converting them into powerful, modern, efficient planer-type milling machines.

SPECIFICATIONS

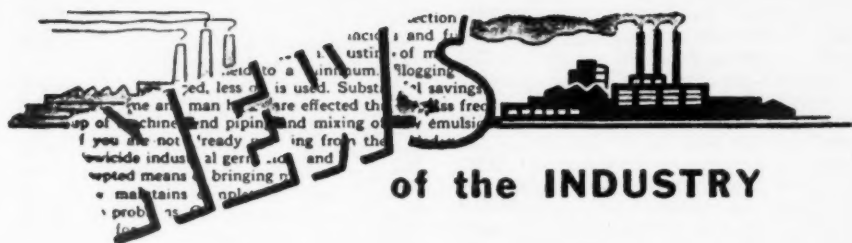
- Heads provided with 22 speeds in ranges up to 1000 RPM
- Infinitely variable Hydraulic feed from 0 to 60" per minute
- Designed for right and left hand, horizontal and vertical operation
- Horsepower ratings available from 10 to 100

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National Metal Show Nov. 1-5

THE AMERICAN SOCIETY for Metals will present the 36th annual National Metal Congress and Exposition in Chicago, Ill., from Nov. 1st to Nov. 5th. The Congress will be held in the headquarters of the participating societies while the Exposition will be held in Chicago's International Amphitheatre.

The 1954 Metal Show will be the 9th annual event to be held in Chicago, which also has the role of being host to the first of the National Metal Expositions, held in 1919.

The Exposition will be the most significant since metallurgical developments have advanced to a stage where complete and thorough exchanges of information are vital to the continued growth and security of the U. S.

263,000 square feet of space is to be utilized for the display and operation of equipment, products and services being brought to Chicago by leading industrial firms across the country. This represents more than six acres devoted to the showing of new products, new processes, new developments and new services being offered by the metal working field. A total of 444 firms will occupy space in the International Amphitheatre.

There will be a diversity of interests in the display and operation at the

many exhibitor booths, ranging from new developments in spot welding to the latest in testing and finishing.

Participating societies are: American Welding Society; Institute of Metals Division; American Institute of Mining and Metallurgical Engineers; and the Society for Non-Destructive Testing.

EXHIBITORS

A B C Die Casting Mach. Co.	2030
A. I. T. Diamond Tool Co.	1658
Ace Drill Bushing Co. Inc.	2255
Acetogen Gas Co.	2147
Acme Mfg. Co.	1640
Acme Steel Co.	2129
Acme Tool Co.	1005
Action Diamond Tool Co.	1135
Adamas Carbide Corp.	1411
Adjusto Equip. Co.,	1057
Air Reduction Sales Co.	341
Ajax Electric Co., Inc.	752
Ajax Electrothermic Corp.	752
Ajax Engineering Corp.	752
Ajem Laboratories, Inc.	1145
Aldridge Industrial Oils, Inc.	1424
Al-Fin Divi. Fairchild Engine & Airplane Corp.	2070
Allegheny Ludlum Steel Corp.	336
Allis-Chalmers Mfg. Co.	242
Allison Co.	142

Alloy Engr. & Casting Co.	1101	Brush Laboratories Co.	2317
Alloy Metal Wire Co. Div. of H. K. Porter Co., Inc.	1645	Buck Tool Co.	460
Alpha Metals, Inc.	2344	Buehler, Ltd.	1239
American Brake Shoe Co.	762	The Cambridge Wire Cloth Co.	1646
American Cast Iron Pipe Co.	1020	Can-Lok Division, Empire Products, Inc.	1056
American Chain & Cable Co.	1036	Campbell Machine Division	1228
American Chemical Paint Co.	132	Carbide & Carbon Chem. Co.	653
American Cynamid Co.	2323	Carboloy Dept.	1540
American Cystoscope Makers, Inc.	843-854	Casting Engineers, Inc.	1746
American Gas Ass'n	843OH	Centri-Spray Corp.	1745
American Gas Furnace Co.	1248	The Challenge Machinery Co.	2130
American Machine & Metals, Inc.	762	Chase Brass & Copper Co.	
American Marietta Co.	1618	Chicago Rivet & Machine Co.	1623
American Metal Market	1549	The Chicago Screw Co.	2223
American Nickeloid Co.	2314	Chicago Tool & Engineering Co.	2253
American Optical Co.	2229	Chilton Co., (See Auto. Industries)	
American Pullmax Co., Inc.	1253		2155 & 1159
American Society for Metals	603	Chrysler Corp.	1335
American Wheelabrator & Equip. Corp.	632	Cincinnati Sub Zero Products Co.	
Chrysler Corp., Amplex Div.	1335	Circo Equip. Co.	225
Applied Research Labs	1342	Cities Service Oil Co.	1216
Arcair Co.	1445	Clementina, Ltd.	1002
Aronson Machine Co.	2354	Clevite Corp.	2317
Arwood Precision Casting Corp.	1254	Climax Molybdenum Co.	148
Ashworth Bros. Inc., Metals Div.	1723	Cold Metal Products	
Atlas Press Co.	2057	Mr. Frank J. O'Laughlin, Commander Mfg. Co.	1309
Atamic Energy of Can. Ltd.		Commercial Filters Corp.	1530
Comm. Prod. Co.	2040	Consolidated Industries, Inc.	1524
Automotive Industries Magazine	2155	Consolidated Vacuum Corp.	2156
Higbie Mfg. Co., Avon Tube Division	1939	Continental Industrial Engineers, Inc.	843-G
The Babcock & Wilcox Co.	236	Cooley Electric Mfg. Corp.	1649
Baird Associates, Inc.	1348	Crane Packing Co.	135
Bakelite Div., Union Carbide & Carbon	653	Dake Engine Co.	1749
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Brake Shoe & Castim Div.	762	Dow Furnace Co., (Sales Dept.)	1041
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The Electric Furnace Co.	636	Expert Welding Machine Co.	1330
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Electro Metallurgical Co.	653	Federal Fawick Corp.	1567
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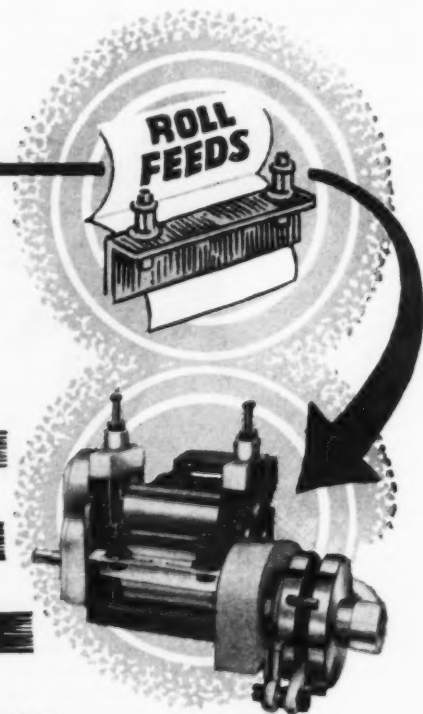
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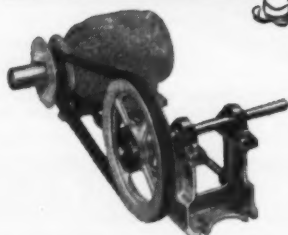
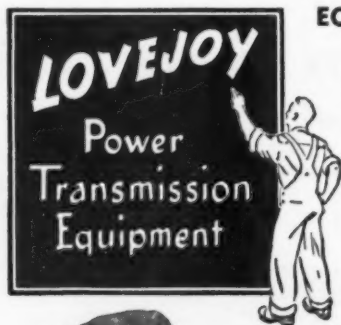
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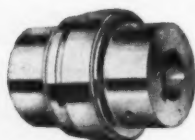
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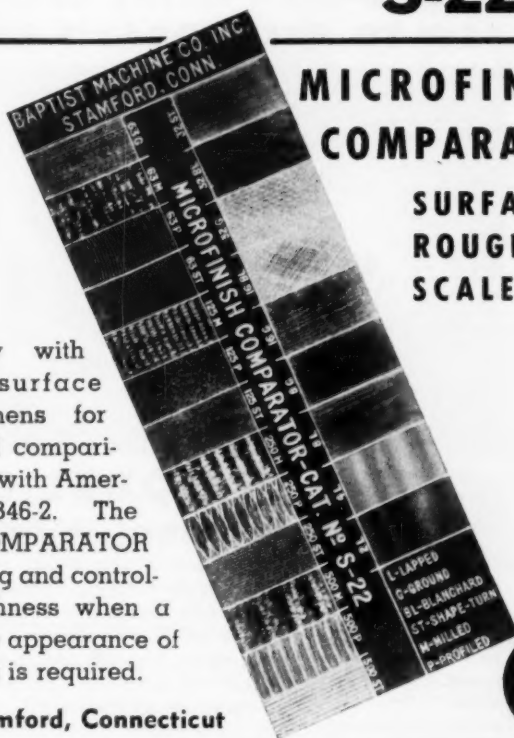
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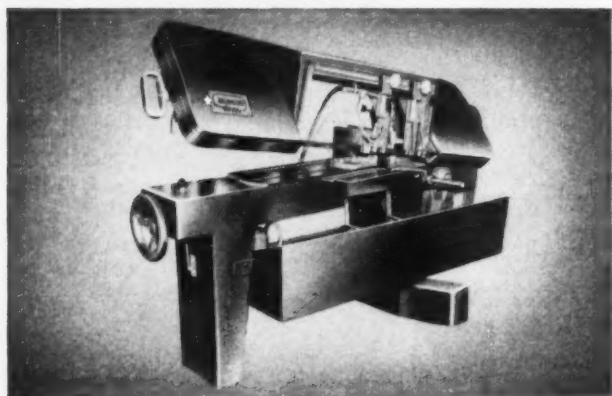
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MODEL 1220 cuts 12" round, 20" flat.

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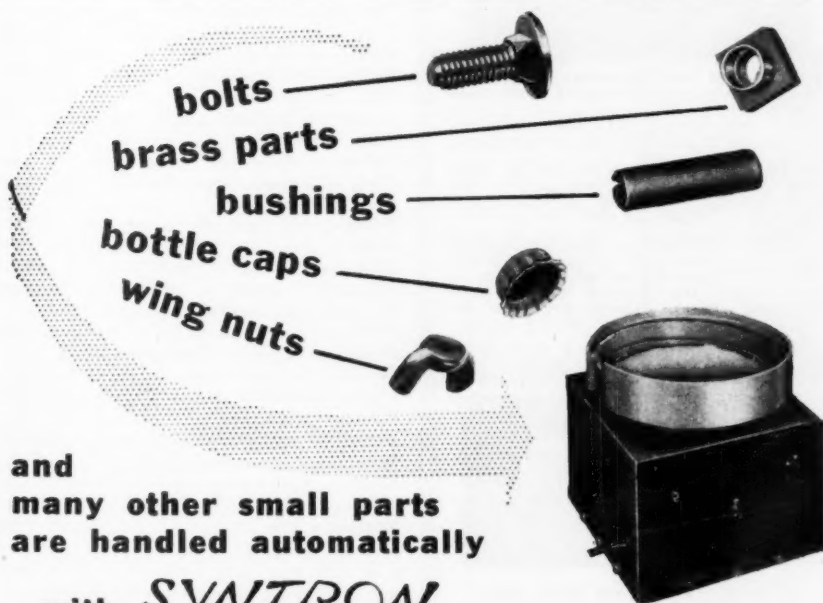
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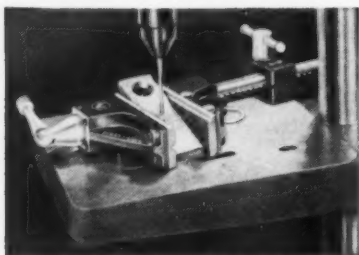
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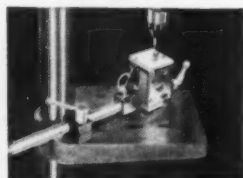


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CUTS JIG COSTS—Serves as base and instant-opening mechanism for low-cost jig . . . cuts jig parts and costs by as much as 80%.

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Rigidized Metals Corp.	1425
Rockwell Mfg. Co.	1053
Rodgers Hydraulic, Inc.	419
Rolle Mfg. Co., Inc.	1336
Rolock, Inc.	1724
Jos. T. Ryerson & Son, Inc.	730
"S" Corrugated Quenched Gap Co.	147
Safety Clothing & Equip. Co.	1547
Salem-Brosius, Inc.	241
Carl Schenck	1247
Geo. Scherr Co., Inc.	1119
Geo. T. Schmidt, Inc.	1362

Schnell Tool & Die Corp.	2241
A. Schrader's Son	1127
Sciaky Bros., Inc.	435
Scientific Electric	147
C. U. Scott & Son, Inc.	456
Scovill Mfg. Co.	430
Seias Corp. of America	854-F
The Sentry Co.	445
Service Diamond Tool Co.	2336
Service Machine Co.	1611
Sharon Steel Corp.	1758
Sheldon Machine Co.	1059
Shell Oil Co.	2359
Shenango-Penn Mold Co.	2112
Sinclair Refining Co.	2049
Skil Corp.	2201
Smith Welding Equip. Corp.	2250
Socony-Vacuum Oil Co., Inc.	1546
Solventol Chem. Products, Inc.	347
South Bend Lathe Works	2256
South Chester Corp. Southco Div.	2324
Southco Div.	2324
Spec. Libraries Assoc., Metals Div. c/o	
Library-American Iron & Steel Inst.	802
Spec. Libraries Assoc. Metals Div.	802
Spec. Libraries Assoc., Metals Div.	
Acme Steel Co.	802
Spencer Turbine Co.	843-K
Sperry Products, Inc.	2212
Square D Co.	1437
Stanat Mfg. Co.	1659
Standard Electrical Tool Co.	1028
Standard Oil Co. of Indiana	2036
The L. S. Starrett Co.	2101
Steel (Publ)	165
Steel City Testing Machines, Inc.	1151
Steel Sales Corp.	725
Sterling Electric Motors, Inc.	1446
Edwin B. Stimpson Co., Inc.	1701
F. J. Stokes Machine Co.	2167
Sub-Zero Products Co.	1630
Sunbeam Corp.	448
Superior Tube Co.	1667
Surface Combustion Corp.	714
Taco West Corp.	2245
Technical Operations, Inc.	312
Tempil Corp.	1523
Tenney Engineering, Inc.	2330
Testing Equip. Company, Inc.	2329
The Texas Company	1529
Tinnerman Products, Inc.	1208
Tin Research Inst., Inc.	1901
Titanium Alloy Mfg. Div.	260
Titanium Metals Corp. of America	226
Tocco Div.	160
Torit Mfg. Co.	2350
The Torrington Mfg. Co.	2060

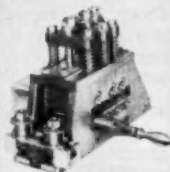
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PRESS ROOM EQUIPMENT

STANDARD STOCK STRAIGHTENERS

Made in nine standard sizes to meet most requirements. Widths from 2" to 8"; roll combinations range from 5 to 9. Special sizes available to specific requirements.



SLIDE FEEDS

For automatic presses, 7 sizes to meet most jobs. Check roller release for faster set-up — has improved one way clutch. Adjustable feed blade with carbide tip. Double feed block stops are non-fouling and easily set.



AUTOMATIC STOCK REEL

Operates by natural spring of uncoiling stock. Platen turns on ball bearings. No motor, belts or sprockets. Loop of stock stops slippage, kick back, and over run. Speed limits controlled only by feed.



Write Now for new catalog showing prices and complete line of Equipment.

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136 SOUTH WATER STREET, PROVIDENCE 3, R. I.

Torsion Balance Co., Kent Cliff Laboratories Div.	2343	W. W. Alloys, Inc., Div.	1559
Tranter Mfg. Inc.	1353	Waldes Kohinoor, Inc.	1556
Tubular Micrometer Co.	2236	Walker-Turner Division	2117
Turco Products, Inc.	2024	Wallace Supplies Mfg. Co.	310
Uddeholm Co. of America, Inc.	201	Waukee Engineering Co.	1121
Union Carbide & Carbon Corp.	653	The Weatherhead Co.	2046
U.S. Electrical Motors, Inc.	2012	Webber Mfg. Co.	1656
United States Plywood Corp.	2240	Wells Mfg. Corp.	219
Universal Castings Corp.	2148	Weltronic Induction Heating Corp.	163
Uniworld Research Corp. of America	126	West Instrument Corp.	2245
Upton Electric Furnace Co.	1118	Westinghouse Electric Corp.	360
Vacu-Blast Co. Inc.	1450	Wheelco Instru. Div., Barber-Colman Co.	1219
Vacuum Equipment Dept.	2156	S. B. Whistler & Sons, Inc.	135
Vac. Metals Corp.	1250	Wiley's Carbide Tool Co.	2146
Vanadium Corp. of America	320	Wilson Mechanical Instrument Division	
Versa-Mill Co.	1359	American Chain & Cable Co., Inc.	1228
Verson Allsteel Press Co.	1316	Worcester Pressed Steel Co.	2001
H. J. Volz Machinery Co.	2256	The Yale & Towne Mfg. Co., Powdered Metal Products Div.	2260

50th Birthday for Motch & Merryweather

This is a story of growth, and a story of daring, too.

It all started 50 years ago when three men, George E. Merryweather, Edwin R. Motch and Stanley Motch banded together and decided to form a company to serve as distributors of machine tools in the rich Ohio and eastern Michigan areas.

Armed with apprenticeships in eastern metalworking plants and education from the Massachusetts Institute of Technology, these three and four employees opened the doors for business in a small office at 711 Lakeside avenue in Cleveland. It was September 1904.

The little company was later to expand its operations to include western Pennsylvania, Kentucky, and part of Maryland, and branch offices were established in Detroit, Pittsburgh, Cincinnati and Dayton. And the humble little staff was to grow to its present strength of 500 employees, including office, sales and factory personnel.

In 1923, the company had outgrown the small quarters on Lakeside avenue. New office space was found in the Penton Building in Cleveland, which still serves as headquarters.

Today, Motch & Merryweather Machinery Company operates six divisions,





E. Franklin Motch



George E. Merryweather

the largest of which is the Machine Tool Distributor Division, with 35 sales engineers covering the territory from Cleveland. The Cutting Tool Distributor Division has 20 sales engineers in the same area. The company's plant at 888 East 70th street, Cleveland, houses the Machinery Manufacturing Division, which builds a line of diversified types of machine tools. Another plant is located at 1250 East 222nd street, Euclid, which houses the Used Machinery and Rebuilding Division and the Cutting Tool Manufacturing Division. Last year the Triple -M- Products Division was established in Gate Mills to produce and merchandise its own design multi-purpose power garden tool.

Now in the second generation, the company carries on with the following offices at the helm: E. Franklin Motch, president and treasurer; George E. Merryweather, vice-president and secretary; Clare R. Kubik, vice-president, administration; Henry A. Murton, assistant treasurer; W. F. Edwards, assistant secretary; Milton R. Kubik, controller; and W. J. Chamberlain, director of sales.

Philip O. Geier, 1876-1954

Philip O. Geier, treasurer and chairman of the board of the Cincinnati Milling Machine Co. until his retirement in 1946, died recently in Tucson, Ariz., where he had been residing because of ill health. He was 77 years old.



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16"

DRILL PRESS

150 to 4000

R.P.M.

INSTANT

SPEED

SELECTION



For drilling, reaming, spot-facing, counter-boring and tapping. Variable speed spindle with built-in back gears, driven by a ½ HP single or three phase built-in motor. Completely enclosed drill head design; no belt changing required.

FEATURES . . . Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart; quick-set vernier depth control; sealed-for-life ball bearings throughout; counterbalanced head on bench model; tilting table and ground base on floor model; No. 2 Morse taper or Jacobs No. 2A taper spindle.

Model 602—600 to 4000 RPM, complete with motor and worklight \$290.00 and up.

Write for free literature.

The ELECTRO-MECHANO Co.

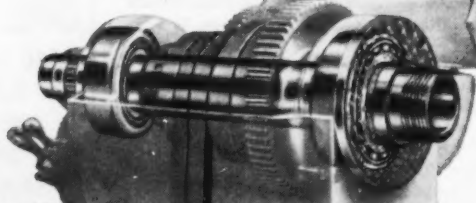
265 E. Erie St.

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SHELDON

CHICAGO U. S. A.

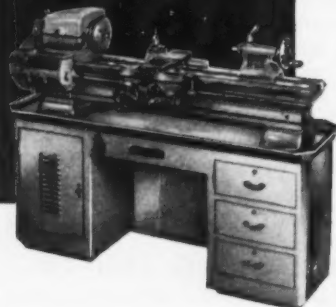
PRECISION LATHES



SHELDON

"Stamina" Features:

- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.



Precision that lasts

... "ZERO PRECISION" TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the exact type and tolerances of bearings used!

All SHELDON Precision Lathes have "Zero Precision" Taper Roller Bearings, held to tolerances of .00015"—more accurate than the bearings found in most lathes. They are also the sturdy type that hold their accuracy thru long, hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

Write for Catalog

SHELDON MACHINE CO., INC.
4242 N. Knox Ave., Chicago 41, Illinois

What's New

IN

METALWORKING

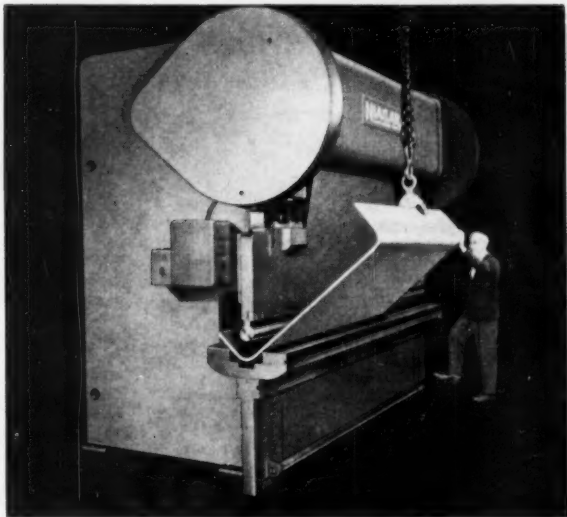
New line of press brakes offers double end twin drive

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 11, N.Y., has introduced a complete, new line of press brakes.

Features include: double end twin drive; rigid frame construction; box type crowns, sealed oil baths for gearing; laminated non-metallic ways, and electro pneumatic clutch.

The last mentioned is extra equipment, for high hourly output in production bending and stamping, for effortless operation, and most safety. Standard equipment on all models is a direct-acting foot treadle.

By means of push buttons, the electro pneumatic clutch control enables the press brake to be single stroked, run continuously or jogged in either direction. Combination air electric and foot treadle control is also available.



Sizes of press brakes are 50 through 775 ton capacity.

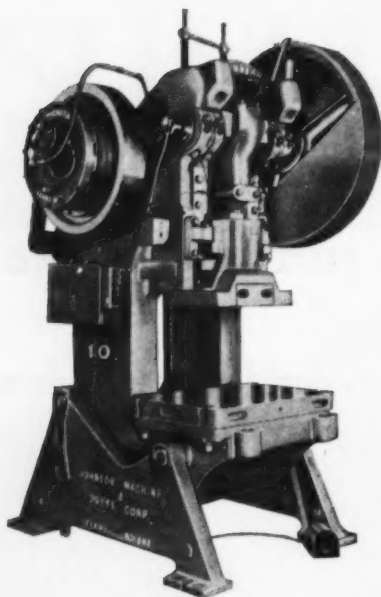
Use ACTION Card, opposite page 64. Encircle No. 1

Larger press added to line

A 116-ton capacity press, Model 10, has been added to the line of open back inclinable power presses manufactured by the Johnson Machine & Press Corp., Dept. B, 620 W. Indiana Ave., Elkhart, Ind.

The unit delivers 26 more tons than the largest press the manufacturer formerly made. Available in flywheel or bull gear models, it features Wichita air clutch and air actuated spring set brake.

The press has 4" stroke and 17½" die space on the standard model. Up to 8"



stroke may be ordered as a special, and additional die space from 17½" to 22½" is also available. The flange ram face is 25" wide by 17" deep. Two inches of additional die space may be had by using a 20½" x 15" ram without flange.

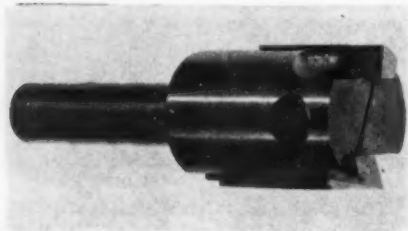
The bed area is 40½" x 28" with 20½" opening through back. The flywheel model is 68 strokes per minute; the back geared style is 40 spm.

Use ACTION Card, opposite page 64. Encircle No. 2

HOLDERS for step-form milling

The Econotool Co., Dept. BB, Jenkintown, Pa., has announced the availability of Combo-Holders, for step-form milling and boring or conventional use.

Standard tool bits are used—HSS, stel-



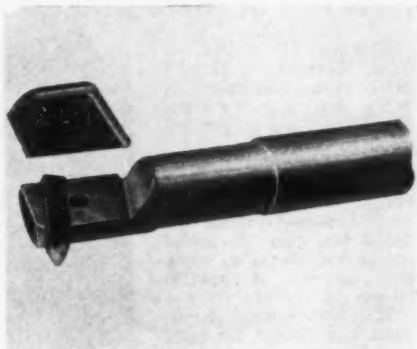
lite, or carbide. Tools ground to same width can be used interchangeably, it is claimed, because of closely held slot tolerance. Holders are made from heat treated alloy steel; compact with maximum tool support; tools are on center line.

Use ACTION Card, opposite page 64. Encircle No. 3

Boring bars feature new clamp design

BH boring bars, manufactured by R. B. Tool Co., Inc., Dept. BB, 784 N. Broadway, White Plains, N. Y., insure firm grip, even with little pressure on the clamp, because both clamp and insert are serrated.

New clamp design eliminates strain on



the inserts and prevents breakage of tool bits, it is claimed. Carbide and HSS inserts have a half-elliptical shape for better side clearance and more strength, less chatter.

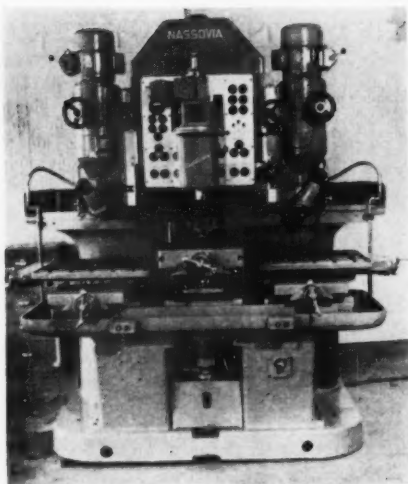
Use ACTION Card, opposite page 64. Encircle No. 4

Die sinker copying machine is hydraulically controlled

A German import, the Nassovia VA-11 die sinker copying machine is being distributed by Carl Hirschmann Co., Dept. BB, 30 Park Ave., Manhasset, N.Y.

The machine has a basic table, in the center of which is fitted a small table, which can be moved backward and forward, holding the master. The center table, in turn, has two worktables fitted to it: one to the right and the other to the left. The two workspindles are arranged vertically over these two tables.

The movements of the slides, which are controlled from the tracer, are operated hydraulically. While the tracer is not in



contact with the master, it performs a rotary probing motion in relation to the tracing direction. Every point on the tracer is moving at the same speed and in the same direction at the same time. This circular motion is transmitted to the vertical slide and an additional downward movement is produced by a corresponding setting of the hydraulic unit, so that the tracer will fall slowly onto the master. The moment it touches the master, its circular movement is stopped, and the control mechanism becomes extremely sensitive, it is claimed.

Use ACTION Card, opposite page 64. Enercile No. 5

Deburring tools feature low torque design

Two new companion tools, Nobursink and Noburod, utilizing a new principle for deburring and chamfering of both inside and outside diameters, have recently been added to the line of deburring tools manufactured by Nobur Mfg. Co., 715 N. Victory, Burbank, Calif.

Nobursink is used for openly accessible hole faces and Noburod for the outer ends of rods, tubes and bosses. A low torque design is claimed to permit rapid off-hand workpiece handling without chatter or development of secondary burr—even on large diameters. Controlled cutter entry prevents snagging, seizing or excessive cutting. Both tools employ a unique two-piece construction permitting cone faces to be cylindrically ground on tool and cutter grinder or on any lathe with a tool post grinder. Half members

New! **PILOT** FLEXIBLE SLEEVE

Put on...
Take off
BY
HAND!



*You can
now use your
broken tang
drills, reamers,
end mills and other
taper shank tools!*



Made of the finest spring steel, the newly developed PILOT sleeve grips the tool firmly along the full length of the taper with far greater surface contact than any ordinary sleeve. Tool and sleeve become almost a solid assembly, yet can be disengaged with a simple twist of the wrist! Never any jamming or scoring to mar the shank.

The PILOT's patented flexible construction assures concentricity. Regrinding of tools is made easy because it adapts itself to any surface irregularity inside the machine spindle and around the tool.

Cut costs... Order the PILOT in the types and sizes you need, **now!**

TYPE A: For drills, etc. with or without broken tang.

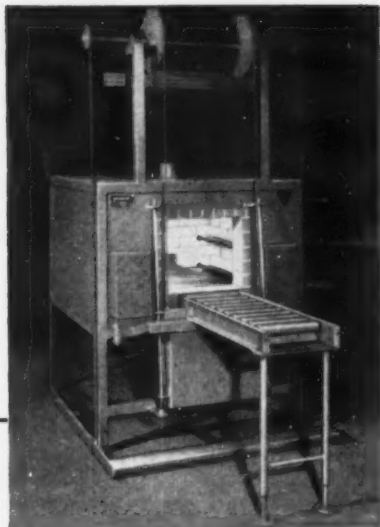
TYPE B: For drills, etc. with broken tang only. Ideal for heavy duty drilling.

Size No.	1	2	3	4	5
Morse Taper	1:2	2:3	3:4	4:5	5:6
Price—FOB New York	\$4.00	\$6.00	\$8.00	\$16.00	\$25.00

PILOT
TOOLS, INC.

225 A LAFAYETTE STREET
NEW YORK 12, N. Y.
Telephone WO 4-8360 61

Easier Handling of heavy loads



PERECO Roller Hearth Electric Furnace

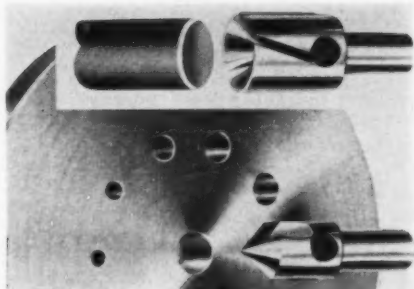
This new Model RH-68 PERECO Electric Roller Hearth Furnace is especially designed for rapid and easy handling of large or heavy loads, such as tools, dies, or products of similar nature which are difficult to load or unload from a hot furnace. Also ideally suited for enameling on bulky or heavy metal items. Typical of all Pereco Furnaces built to specialized job-requirement, automatic temperature controls of all standard makes are available to meet the individual need. Tell us **your** need and let us propose the answer.

Write Today



**PERENY
Equipment Co.**

Dept. Y, 893 Chambers Rd.
Columbus 12, Ohio



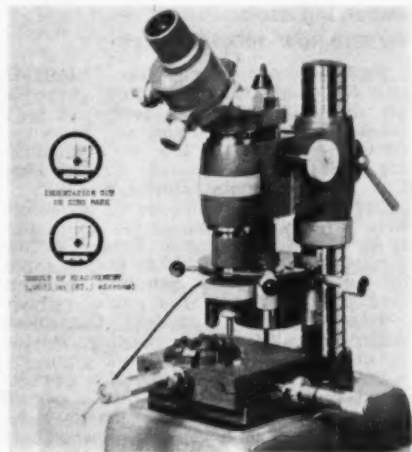
are then locked in a displaced position, to provide automatic radial relief.

Range of application extends from less than 1/16" hole size up to body diameter. Tools are furnished 90° included angle (produces a 45° chamfer)—made from high speed steel, heat treated and precision ground.

Use ACTION Card, opposite page 64. Encircle No. 6

Hardness tester doesn't mar surface

Making only the most minute scratches or impressions which cannot be seen with the naked eye and so small that even the finest finish is not marred by the test, a hardness tester recently placed on the market by the George Scherr Co., Inc., 200 MTD Lafayette St., New York 12, N.Y., is a portable bench type instrument combining a positive controlled diamond penetrating action with a high power microscope of 400 magnifications. The microscope is swung directly over the



impression to read the hardness by measuring with a reticule scale and vernier in .0005 millimeter resulting in hardness readings in half a micron (.0005 millimeter).

Use ACTION Card, opposite page 64. Encircle No. 7

Air cylinders have 1 1/8 bore

The A. K. Allen Co., Dept. MB, 57 Meserole Ave., Brooklyn 22, N.Y., has announced the introduction of Allenair Studmount cylinders, which have a 1 1/8



bore and are available in inches and half-inches of stroke from 1" to 6" maximum. Cylinder is double acting and features brass heads, nickel plated and screwed into the honed and Copper-brited cylinder tube.

The piston rod is stainless steel and is both screwed and brazed to the brass piston. Standard O rings are used for sealing both the piston and the piston rod. Flange or foot mounts as well as a piston rod clevis are available.

Use ACTION Card, opposite page 64. Encircle No. 8

Schauer vertical spindle speed lathe offers variable speed

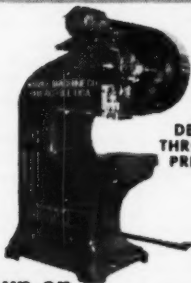
A new addition to their line of speed lathes is now being produced by the Schauer Mfg. Corp., 4502 Alpine Ave., Cincinnati 36, Ohio, and is identified as their Type VAU3BCV vertical spindle vacuum-type speed lathe.

Designed with a vertical spindle to permit easy loading of large or heavy work pieces in the vacuum holding fixture; overall height 35"; spindle speeds

Want to KEEP PRODUCTION HUMMING — at lower cost?



O. B. I.
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DEEP
THROAT
PRESS



HORN
PRESS



Then check up on

ROUSSELLE
PRESSES



These jobs will stand up under severe service—and they're fast . . . accurate . . . steady. Modern precision machining (stressing ruggedness and simplicity) has seen to that. But it also accounts for their very low maintenance, surprisingly low cost and broad, all-around versatility. With Rousselle presses you can shear, punch, bend and form metals; cut and punch paper; form and trim fibre and plastics and handle other materials.

Since considerable savings are often possible, if you let our engineering staff assist you, we will be glad to cooperate. There is no obligation. Simply explain problem and send sample or drawing of work.

Rousselle Presses are sold exclusively through leading Machinery Dealers and are Manufactured by

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FASTER GRINDING!**

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AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$42⁰⁰

IN U.S.A.



Weight 12 ounces;
length 6½ inches;
chuck size ¼ inch.
Wheel guard removed
for better illustration.

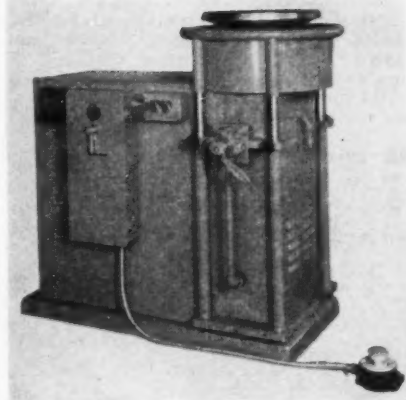
The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

207 Waubesa St., Madison 10, Wis., U.S.A.



range from 100 rpm to 4800 rpm and are infinitely variable; motor coupled to the spindle through twin disc clutch; large disc-type brake provides fast stopping of the spindle; clutch and brake controlled by single foot treadle.

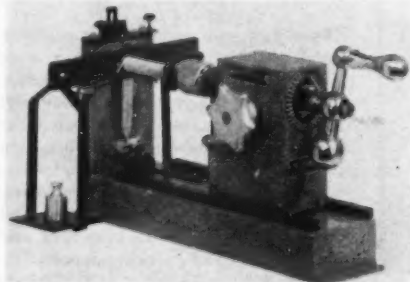
Use ACTION Card, opposite page 64. Encircle No. 9

Torsion spring tester

A universal tester to check loads and deflections of torsion, double torsion, spiral, clock and power springs is available from the Carlson Co., Dept. B, 277 Broadway, New York 7, N.Y.

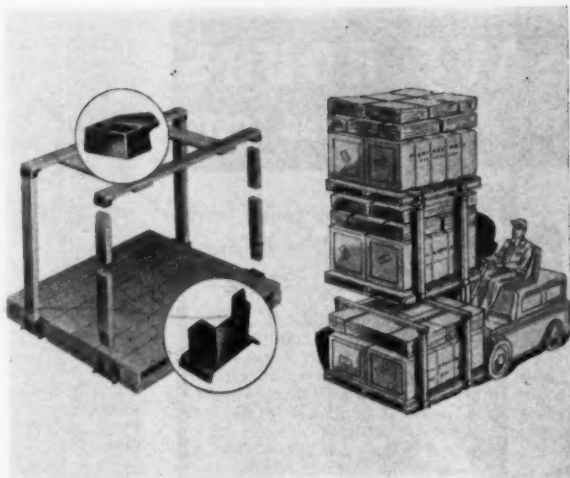
Although useful for general purpose testing, it can be used for high quantity production testing of torque and angular travel at speeds of 300 to 600 tests per hour. The tester meets requirements of National Bureau of Standards for precision scales and is claimed accurate within ¼ of 1%. Torsion springs having wire dia. from .005" to .125", outside dia. from 1/16" to 6", lengths from 1/16" to 6", can be tested for torque from ¼ in. oz. or 48 in. lbs.

Use ACTION Card, opposite page 64. Encircle No. 10



V socket type hardware assembles to any standard pallet. With 2" x 4" uprights each pallet will carry a load of 1500 lb. in a tier of three, a total of 4500 lb. Additional load capacity can be attained by using 3" x 4" 's. Hardware can be adapted to shelving, bins and KD boxes. The Paltier Corp., Dept. BB, 1701 Kentucky St., Michigan City, Ind.

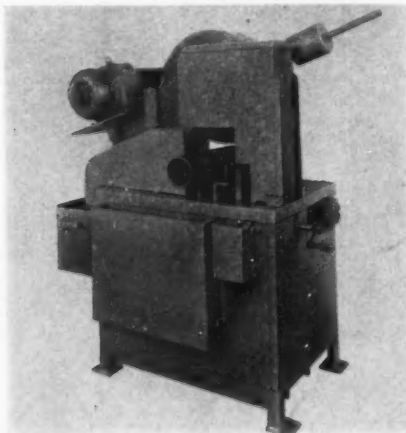
Use ACTION card opposite page 64. Encircle No. 11



Dry abrasive cutting machine

A newly designed dry abrasive cutting machine, Campbell Model No. 28 Sever-All, has been announced by the Campbell Machine Div., American Chain & Cable Co., Inc., Dept. B, Bridgeport 2, Conn.

Compact in size, 62" in height, the No. 28 is available in two types, stationary and portable, and has cutting capacities as follows: Capacity for solid steel, up to 4" x 4"; capacity for angles and channels, 8"; capacity for tubes and pipes, 4"



o.d.; capacity for 45° angles and channels, 4½"; capacity for 45° pipe, 4" o.d.

Hand operated self-centering work holders clamp the work on both sides of the cut. It may also be furnished with foot operated treadle.

Use ACTION Card, opposite page 64. Encircle No. 12

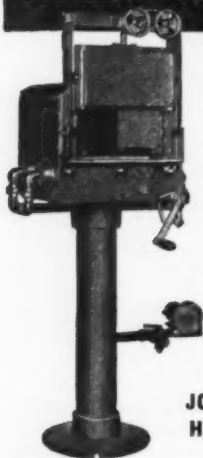
3-dimensional engraver introduced by Preis

A new three-dimensional engraving machine that will engrave steel, other metals, plastics, wood and similar materials in ratios ranging from 1.7:1 to 7:1 is announced by H. P. Preis Engraving Machine Co., 163 Industrial Branch, Hillside, N. J. It is designated as the Preis-Panto Model 3D-5 Engraver and is also equipped to be used for engraving enlargements in the reverse of the above ratios by simple alternation of the spindle and tracing stylus.

High precision engraving of stamps, dies, molds, models, medallions, etc., within the limits of a 4½" dia. circle at 2:1 ratio and within a 1¾" circle at 7:1 ratio is accomplished at any of four spindle speeds suited to the work. These speeds are 5000, 7000, 9000 and 12000 rpm, subject to easy selection, as needed by the operator.

The size of work that can be done is only limited by the work area at required

SAVE HOURS CUT HEAT TREATING COSTS



**Quick Acting
JOHNSON No. 142
Hi-Speed Furnace**

Save time, save gas . . . heat treat carbon and high speed steels, dies and tools with **JOHNSON 142**. Powerful burners provide fast uniform heat with time saving speed. Gets the job done while other furnaces are still warming up. Two sizes offer wide temperature range for any steels. Temperatures easily regulated with accuracy. Counter-balanced door opens upwards. Firebox 7"x13"x16½" lined with high temperature refractory. Complete with Carbofrax Hearth, G.E. Motor and Johnson Blower.

For temperature range
1400° to 2350°F\$325.00

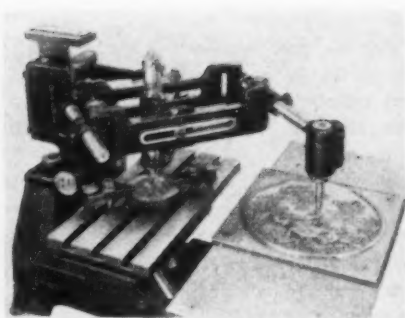
For temperature range
1800° to 2400°F\$355.00

F.O.B. Factory

Models available in smaller firebox sizes. Write for Free Catalog.

JOHNSON GAS APPLIANCE CO.
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Since 1901

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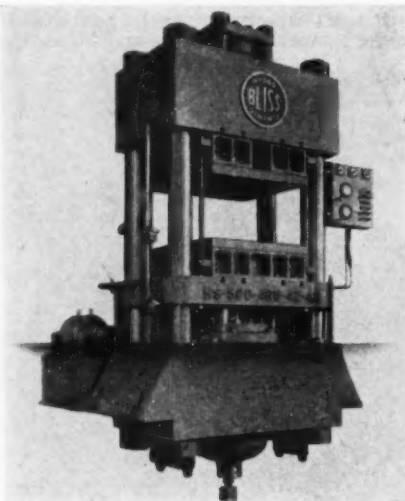
ratio. The 3D-5 is 23" long, 48" high and 19" wide; furnished with 1725 rpm ball bearing motor, 115 volt ac, 60 cycle, work table, clamps, copy holder, spindle, collet, belts, pulley, cutters, grease gun, wrenches.

Use ACTION Card, opposite page 64. Encircle No. 13

Molding press forms plastic parts in a closed die

A newly designed 500-ton hydraulic transfer molding press for forming plastic parts in a closed die was recently completed at E. W. Bliss Company's Canton, Ohio, plant.

Plastic pre-forms are manually loaded into a transfer cavity, then moved under



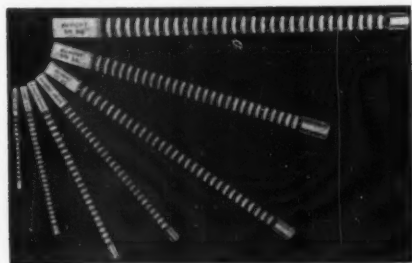
MACHINE and TOOL BLUE BOOK

pressure by the transfer ram into a die cavity. Pressures from main ram and transfer ram are maintained until proper curing is effected. Then both rams retract, the main ram activating mechanical knockouts to release molded parts.

Use ACTION Card, opposite page 64. Encircle No. 14

Square broaches finish hole in one pass

The du Mont Corp., Dept. T, Greenfield, Mass., has announced a line of Minute Man high speed steel, push type square broaches. Available are eight



standard sizes from 3/16" square to 3/4" square, manufactured to close tolerances.

The broaches, starting with a round pilot, will finish a square hole in a drilled, reamed or cast bore in one pass, in less than one minute, it is claimed. They may be used in either a hand-operated arbor press or a hydraulic press.

Use ACTION Card, opposite page 61. Encircle No. 15

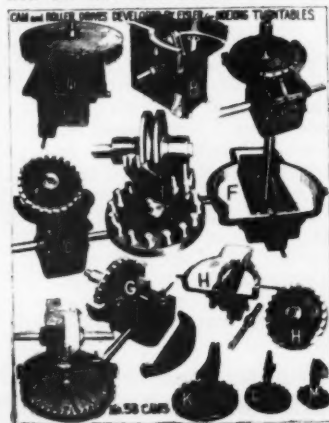
Cutter relief angle grinding simplified with wheel forming attachment

A new Diaform wheel forming attachment designed to simplify the grinding of relief angles on forming tools, has been announced by Pratt & Whitney, division Niles-Bement-Pond Co., 22 Charter Oak Blvd., West Hartford 1, Conn. Attachment works on the pantograph principle, and has been titled the Series R Diaform with relief angle compensator.

In operation, the template is mounted on the template carrier, which is tilted to the included angle of both the end relief and top rake. For side relief the entire carrier is swiveled out to the desired angle. The wheel is form-trued by

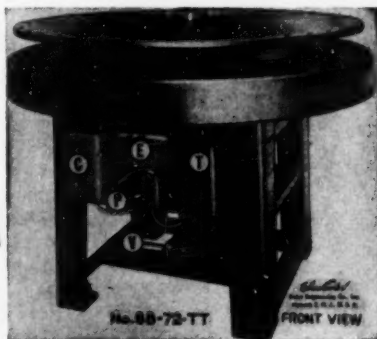
INDEXING TURNTABLES AND POSITIONERS

Eisler makes over 100 different types for welding, brazing, soldering, spraying, glass insulators, melting and glass glazing with rotating stations and motorized or hand operated. Rotating tables of all kinds for over 33 years. We supply any part or complete equipment and we make special turntables to your order and same made to order.



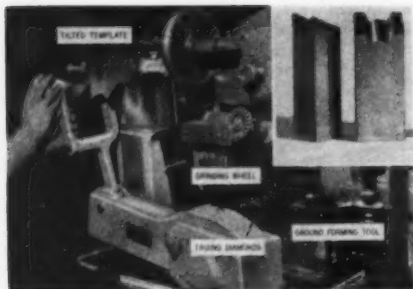
A SPECIALIZED CAM MILLING SERVICE, SPOT AND BUTT WELDER

C
A
M
S



DR. CHAS. EISLER M.E., PRES.

EISLER ENGINEERING CO., INC., 762 So. 13th Street, Newark, N. J.



lightly traversing the tracing bar over the profile of the tilted and swiveled template. The path of the tracer is transmitted through the pantograph mechanism at a 5:1 or 10:1 reduction ratio (depending on the Model Diaform) to the truing diamonds, which quickly form-true the grinding wheel to the "distorted" template form.

Use ACTION Card, opposite page 64. Encircle No. 16

Powdered iron bearings, parts

Johnson Bronze Co., Dept. MTB, New Castle, Pa., is now producing powdered iron bearings and structural parts.

Bearings are claimed to offer distinct advantages providing the application is suited to this type of product: low cost, good resistance to pounding and wear, self-lubrication and close tolerances.

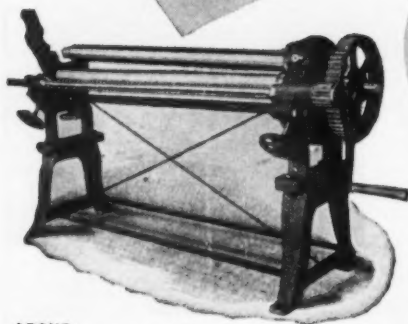
Use ACTION Card, opposite page 64. Encircle No. 17

Marking machine for round part stamping

A machine for stamping the periphery of tubing, bushings, collets and other



Beloit SLIP ROLL HAND FORMING MACHINE



ABOVE:
No. 14 single back geared sliproll, floor model with capacity of 14 ga. 31 other models to meet every need.

Also manufacturers of
Punches, Shears, Rod
Cutters, Bending and
Straightening Rolls.

Operates to full rated capacity by hand or by power! Compact and heavy duty for years and years of hard usage. The two feed rolls, geared together, assure positive feed on even the thinnest material. The third roll is idle but can be made for gear drive at nominal cost. Completed work is easily and quickly removed. Made in bench and floor models, single and double back.

Write for complete details.

**HENDLEY &
WHITEMORE CO.**
100 Blackhawk Blvd. Beloit, Wis.

round pieces has been developed by M. E. Cunningham Co., 1043 Chateau St., Pittsburgh 33, Pa.

When the handle is turned, the gear arrangement causes the die to rotate with the piece held in the arbor, with the lettering rolling into the part. The roller marking die may be either solid or insert style.

Arbors are furnished for any size of tubing, but it is not necessary to use a different arbor for every inside diameter size. A fine screw adjustment is provided to allow for setting depth of impression.

Use ACTION Card, opposite page 64. Encircle No. 18

Five pound balancer

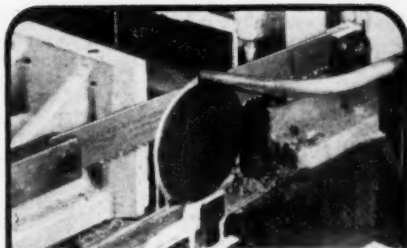
A new balancer (Model 7472) for suspending all types of portable tools (air or electric), gages and fixtures weighing



up to 5 lb. has been announced by the Aro Equipment Corp., Dept. B, Bryan, Ohio.

It is designed so that all adjustments are on outside. In-line suspension prevents twisting or turning when cable is pulled out. Cable is sheathed with wear-resisting nylon.

Housing is made of lightweight metal with flat profile. Simple adjustment for spring tension can be made after tool



TO CUT COSTS when CUTTING METALS

Consider these Facts

When you buy machine tools, it's not the initial cost that counts — it's the production these tools deliver! And with metal-cutting saw blades, it's the performance . . . the quality of the sawing . . . the life of the blade that determines the true value of the purchase.

But, in the final analysis, the proof of product superiority is found only by use in your plant with your materials and equipment. Your nearby MILFORD Distributor is ready to arrange a demonstration for you. Contact him, or write to the factory — today.

*Profile Blades and Band Saw Blades,
Hand and Power Hack Saw Blades*

THE HENRY G. THOMPSON & SON CO.

Saw Blade Specialists for Over 75 Years
NEW HAVEN 5, CONNECTICUT

- ☐ Please send the MILFORD Metal Cutting Catalog.
☐ I would like a MILFORD demonstration in my plant.

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CO. ADDRESS _____

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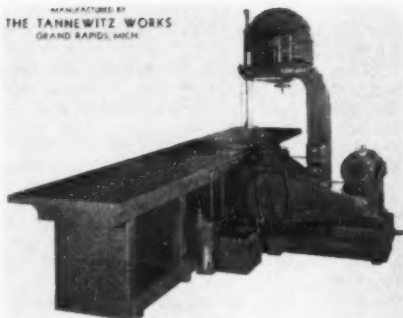
and balancer have been mounted. This is accomplished by pressing spring lever to relieve tension, or tighten nut on opposite side to increase tension. Cable stop is adjustable for regulating length of travel. Use ACTION Card, opposite page 64. Encircle No. 19

Metal cutting band saw with 19 ft. table

The Tannewitz Works, manufacturers of metal and woodcutting band saws, have recently supplied a band saw for cutting off sections of cellulose acetate of 24" diameter; it also could be used, according to the manufacturers, in cutting off steel and aluminum structural members, graphite blocks and a large variety of other materials.

Basically it is a 30" variable speed band saw running at any desired speed in ratio of 6:1 mounted on a sliding base with a travel of 30" and hydraulically operated. The machine advances towards the table, with the sawblade, which is given a 90 degree twist, entering the slot in the center table. Rate of travel is said to be 0-8" per second. The table which is 43" deep, extends 129" to the left and 99" to the right—a total distance of 19 ft. 27" of clearance are provided between the table and upper guide. A coolant pump

MANUFACTURED BY
THE TANNEWITZ WORKS
GRAND RAPIDS, MICH.



and tank are standard equipment as are automatic two-wheel brakes which stop the wheels instantly in case of sawblade breakage. The Tannewitz Works, Grand Rapids, Mich.

Use ACTION Card, opposite page 64. Encircle No. 20

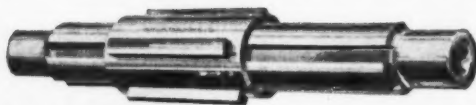
Explosion-proof motor

The Lima Electric Motor Co., 119 Findlay Rd., Lima, Ohio, has announced the Type EX explosion-proof motor, designed for use in hazardous locations where gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors and

SET OF

14 Nicholson Mandrels

► Takes Every Size Bore 1/2" to 7"



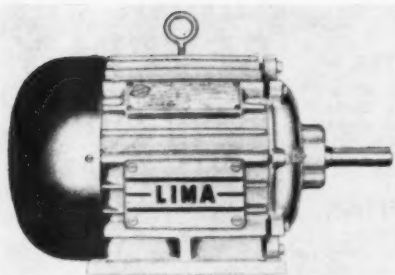
Actually 209 solid arbors would be required to fit all bores between 1/2" and 7", advancing by 1/32". But 14 Nicholson Expanding Mandrels will accommodate this entire range, and all in-between sizes as well. Hard-

ened tool steel. Sold singly or in sets. The standard in shops the nation over. BULLETIN 653 shows how to save time, promote precision with these widely used tools.

117 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

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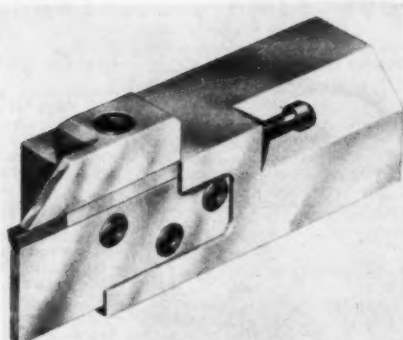


natural gas are present. The motor is totally enclosed, fan-cooled, UL approved for Class 1 Group D service. It is manufactured in ratings of $\frac{3}{4}$ hp to 20 hp in NEMA frame sizes 224 to 326 inclusive, for operation on 2 or 3 phase, all commercial frequencies and voltages below 600.

Use ACTION Card, opposite page 64. Encircle No. 21

Cut-off tool with V-blade support

Newly designed clamp-on tool for cut-off work features a V blade support claimed to assure accurate location of the carbide cutting insert: always on cen-



ter and will not lead-off during cutting. Heavy feeds, fast sfm, and 15 second insert change are further claims. The tool body need not be moved in the setup to replace a dull cutting insert.

Interchangeable blade inserts are of molded carbide, butt welded to the steel shank. Carbide inserts are solid. The Portage Double Quick Tool Co., 1037 Sweitzer Avenue, Akron 11, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 22

QUADRO LIVE CENTERS

**SPEED UNIT PRODUCTION
RUGGED • FRICTIONLESS • ACCURATE**

QUADRO LIVE CENTERS will take heaviest loads at highest speeds for the longest time. That's why they are specified 8 out of 10 times by factory management. On lathes, millers — any machine tool — you can count on QUADRO CENTERS for closer tolerances, fewer rejects, greatly increased production. Guaranteed!

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NEW HYDE PARK L. I., N. Y.



"TWO DECADES OF IMPORTANT TOOL PARTS PRODUCTION"

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BEVERLY metal cutting SHEARS



Inside SLOTTER

Makes cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.

Throatless SHEAR

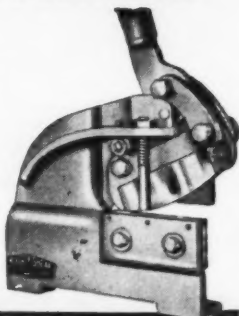
Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—cap. to 3/16".



Slitting SHEAR

New "SS" Series—easier cutting with compounded linkage. 3 models—cap. to 3/16"; trimming capacity to 5/16" mild.

See your Beverly Distributor.
Write for FREE Illustrated Bulletin.



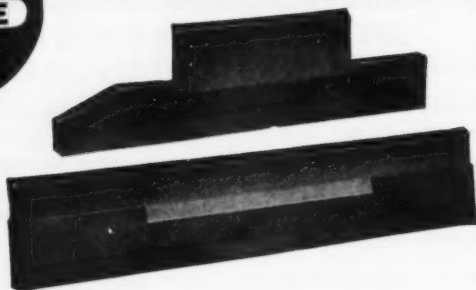
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Standard thrufeed and in-feed work support blades available from stock. Prices on special blades quoted on receipt of prints.

CARBIDE TIPPED Work Support Blades for CENTERLESS GRINDERS



SPECIAL TOOLS — Prompt quotes on receipt of prints

WILLEY'S CARBIDE TOOL CO.

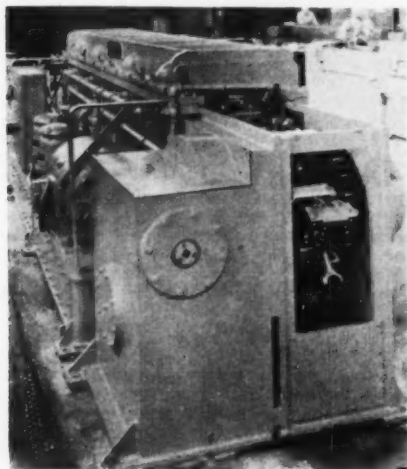
SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

**Continuous broaching machine
produces 1800 connecting rods
per hour**

The Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass., has built a



horizontal type continuous broaching machine claimed to have a production rate, at top speed, of 1800 connecting rods per hour. The part is the customary steel forging, the amount of stock removed being approximately $\frac{1}{8}$ " per surface.

Built with a stroke of 120 inches, the machine is powered by a 30 h.p. motor. A series of individual, self-operating, self-locating, and self-clamping fixtures is so arranged that the operator merely has to insert the parts into the work nests. The machine will stop automatically if something should occur to interfere with its normal operation.

Use ACTION Card, opposite page 64. Encircle No. 23

**Automatic broaching by American
three-way machine**

This completely automatic vertical hydraulic 3-way type broaching machine was built by the American Broach and Machine Company to broach the I.D. of laminated stators for electrical motors. Designed to fit into a conveyor line, the machine features an automatic loading and ejection mechanism that makes it possible to run the machine on continuous automatic cycle.

Parts coming into the machine on the conveyor line are shuttled into broaching

STOP DUSTS INSTANTLY

with

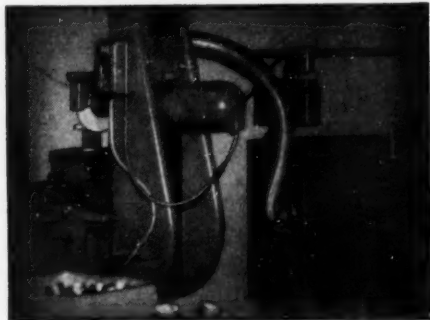
DUSTKOP

Available from stock of 32
standard models

300 cfm to 10,000 cfm

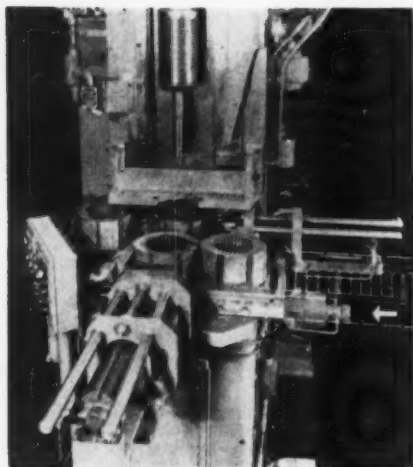
for: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-3. Describe dust problems for recommendation by return mail—no obligation.



AGET-DETROIT CO.

502 Main St. Ann Arbor, Michigan



position by a hydraulic cylinder interlocked to the machine cycle. A broach retriever lowers the broach shank or arbor through the part until it connects with the automatic pull down head. The broach is then pulled down through the

part, finishing the inside laminated surfaces of the stator. With the broach in down position, free of the part, a second hydraulic cylinder ejects the part out of broaching position onto the conveyor line. The broach is then returned to the broach retriever, which raises it to starting position, completing one cycle. The cycle automatically repeats as long as parts are fed to the machine by the conveyor line.

Tooling includes various sized broach shells for broaching similar stator parts, which adapt to a common broach arbor. The broach retriever is mounted on its own ways, separate from the machine slide, and is designed with extra stroke to follow the broach through the principal portion of the broaching stroke. Under ideal conditions a production rate of over 200 parts per hour can be maintained.

Use ACTION Card, opposite page 64. Encircle No. 24

Color filling, printing machine

A new color filling and printing machine for light filling of small parts of metal, plastic and other materials with colored ink, enamel or varnish has been developed for air operation on standard factory air hose connections by the Acro-

BLUE VALLEY FLANGING MACHINES

No. 1 10 gauge capacity circle shear and flanger; from 14" to 6" diameter flat with support; 12" diameter less support.

No. 3 1/4" capacity flanging flat heads from 18" to 12".

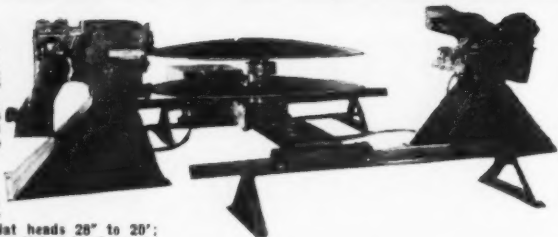
No. 4 3/4" capacity flanging flat heads 20" to 12"; also handles standard dished heads up to 12" dia.

No. 5

1/2" capacity flanging flat heads 24" to 20"; also handles dished heads up to 12" dia.

No. 6

3/4" capacity for flanging flat heads 28" to 20"; also handles dished heads up to 12" dia.

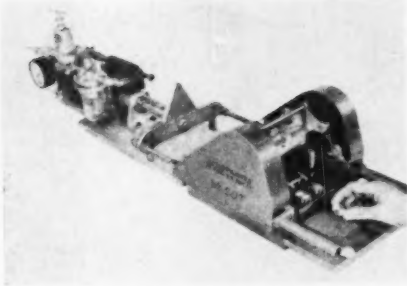


No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from same template without removing work from the machine.

Shown is Model No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from the same template without removing work from the machine.

BLUE VALLEY MACHINE & MFG. CO.

6832 Truman Road KANSAS CITY 26, MO.



mark Co., 546 Morrell St., Elizabeth, N.J.

The printing and filling part of the machine is said to be an improvement in the Acropainter driven by a gear arrangement and powered by an air unit. Aside from the printing unit itself, the machine is entirely new and because of the air power drive it doubles the printing or filling production of the smaller hand model.

This machine will apply color to depressed or sunken design and lettering, and will also print name-plates, signal parts, ornaments, emblems, novelties, machine parts, etc., of metal or plastic at speeds ranging from 15 to 120 per minute, depending upon the operator's feeding speed as determined by the size, shape and positioning and complexity of the part.

Use ACTION Card, opposite page 64. Encircle No. 25

Automatic loader speeds shaving operations on long-shaft, unsymmetrical gears

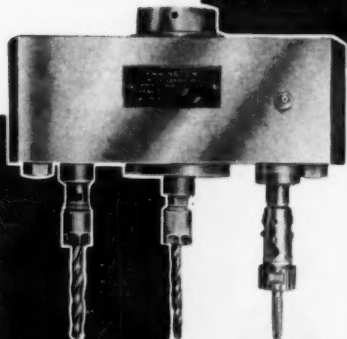
A new type of Red Ring automatic loader for handling long-shaft, unsymmetrical gears on standard rotary shaving machines has been announced by National Broach & Machine Co., Dept. BB, 5600 St. Jean, Detroit 13, Mich. The loader has a built-in gaging device, magazine feed, air-powered loading fingers and a discharge chute that feeds finish-shaved parts to unloading position in front of the operator.

A specially designed set of lever-type trip fingers in both input magazine and discharge chute keeps the gears from touching each other and is claimed to avoid the cocking parts that can result from the effect of the greater weight of one end of an unsymmetrical long-shaft gear.

Operation of the loader is completely automatic when used in conjunction with

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YOU CAN**

- DRILL
- COUNTERSINK
- REAM
- COUNTERBORE
- TAP



ERRINGTON TAP-DRILL ATTACHMENT

Capacity to 1/4" drill and 5/16" tap. Available with 2, 3 or 4 Spindles. Spindles spaced to handle work up to 3 1/2" outside diameter.

ALL ON ONE DRILL PRESS SPINDLE

... without taking your hand off drill press feed handle. Yes... with this new Errington Tap-Drill attachment, you simply slide the work under the head from one spindle to another. An automatic reversing tapping spindle is built in, making it unnecessary to reverse the drill press for tapping. Hardened and ground spindles. Gears turned on spindles (not pinned on). Heavy duty grooved ball thrust bearings all enclosed in a sand cast aluminum case and cover.

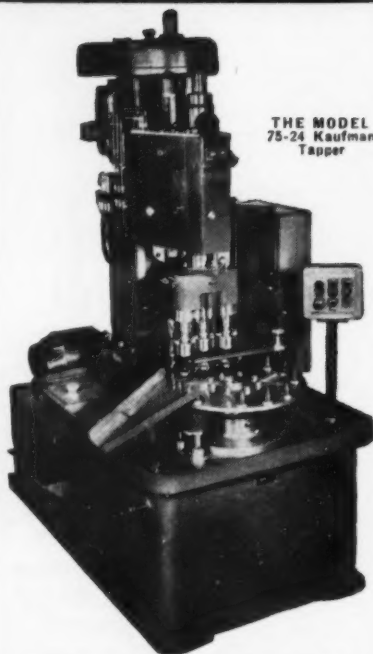
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Information

ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant, STATEN ISLAND 4, NEW YORK

KAUFMAN TAPPING MACHINES



THE MODEL
75-24 Kaufman
Tapper

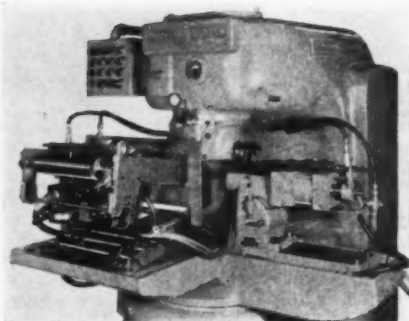
Built For Specific Production Jobs

- Single or Multiple Operations
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- And Many Other Worthwhile Features

Send prints and samples of your work for further information and recommendations on how Kaufman Tapping Machines can reduce your production costs.

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KAUFMAN MFG. CO.
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a standard rotary gear shaving machine equipped with suitable controls and an air-powered tailstock.

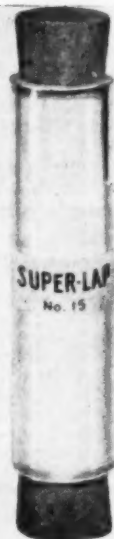
The loader illustrated handles a 14 diametrical pitch, $3\frac{1}{4}$ " od, 1" wide gear having an integral shaft $17\frac{1}{2}$ " long at the rate of 180 gears an hour. This design is available in a variety of sizes. Use ACTION Card, opposite page 64. Encircle No. 26

Diamond compound in paste form

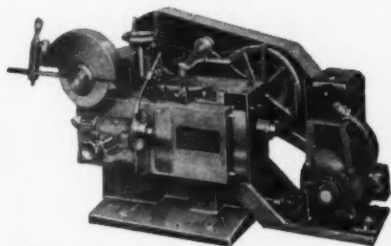
A diamond compound known as Super-Lap has recently been introduced by Acme Scientific Co., Dept. MB, 1450 W. Randolph St., Chicago 7, Ill.

It is said to contain diamond particles accurately graded to National Bureau of Standards specifications, to insure uniform results, no loss from non-functioning undersize fines, and no oversize grains to cause scratching. Super-Lap is used for roughing, lapping, polishing and super-finishing on such items as plastic molds, ceramic parts, carbide dies, cutting tools, plug and ring gages, etc. It is supplied in paste form in four grades, distinctively colored to eliminate confusion: yellow, No. 3, 8000 mesh; red, No. 6, 3000 mesh; green, No. 9, 1800 mesh; blue, No. 15, 1200 mesh.

Use ACTION Card, opposite page 64. Encircle No. 27



Sharpen Metal Saws in Gangs and Reduce Maintenance Costs



The Wardwell Grinder 35 T sharpens up to 115 saws .015 thick at one time, including slitting and screw slotting saws and milling cutters up to 5½" diameter. Completely automatic. Just start machine - it does the rest.

Save money and **make** money with a 35 T Saw Grinder

Please write for Bulletin 35 T—
Sent Upon Request



WARDWELL MANUFACTURING CO.
3807 Ridge Road, CLEVELAND 9, OHIO

Maker of largest line of saw and tool sharpening machines

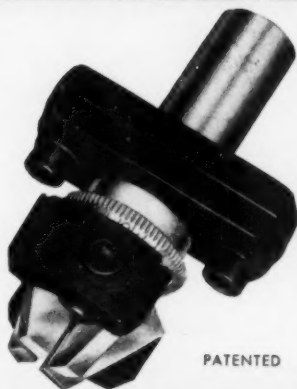
KUTMORE ADJUSTABLE HOLLOW MILLS

A MIGHTY MIDGET !

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

**WRITE TODAY FOR
CATALOGUE No. 20-BB**

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.



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CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO.
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Sid Tool Company

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HIGH SPEED SPECIAL RIGHT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
4	32-48-60-64	3/8	12-16-18-20-27-28-32-36-40-48	1-3/4	8-10-12-14-16-18-20-24
5	30-32-36-48-80	7/16	12-16-18-22-24-27-28-30-32-36-40	1-13/16	8-10-12-14-16-18-20
6	36-40-48-56-60			1-7/8	8-10-12-14-16-18-20-24
7	32-40	1/2	12-14-16-18-22-24-26-27-28-30-32-40	2	4-1/2-8-10-12-16-18-20
8	24-30-36-38-40-44-48	9/16	16-20-24-27-28-30-32-40-48	2-1/16	12-14-16-18-20
9	24-28-32-40	5/8	12-14-16-20-24-27-28-32-36-40	2-1/8	12-16-20
10	28-30-36-40-48-64	11/16	11-16-18-20-24-27-28-30-32	2-3/16	12-16
12	20-28-32-36	3/4	9-11-12-14-18-20-24-26-27-28-32	2-1/4	4-1/2-8-12-14-16-18
14	20-24-28	13/16	10-14-18-20-32	2-5/16	12-18
1 1/16	80-64	7/8	10-12-16-18-20-24-27-28-32	2-3/8	12-16-18
5/64	72	15/16	8-9-10-12 4-16-18-20-24-32	2-1/2	8-10-12
3/32	48	1	10-12-16-18-20-24-27-32-40	2-9/16	18
7/64	48-56	1-1/16	12-14-16-18-20-24	2-5/8	12-16-20
1/8	32-40	1-1/8	8-10-14-16-18-20-24-32	2-3/4	16
5/32	32-36-40	1-3/16	8-10-12-14-16-18-20-24	2-7/8	8-12-16
9/64	36-40	1-1/4	8-10-14-16-18-20-24-32	3	8-16
11/64	36	1-5/16	12-14-16-18-20-24-32	3-1/4	8-12-16
3/16	20-24-32	1-3/8	8-10-14-16-18-20-24	3-1/2	8-12-16
13/64	32	1-7/16	8-10-12-16-18-20-24	3-7/8	6
7/32	24-28-32	1-1/2	8-10-14-16-18-20-24-28	4	8-12
1/4	18-24-26-27	1-5/16	18-20-24		
5/16	30-32-36-40	1-5/8	5-1/2-8-10-12-13-16-18-20-24		
	16-20-22-27	1-11/16	10-12-14-16-18-20-24		
	28-32-40				



HIGH SPEED LEFT HAND TAPS

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	6-8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	37-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	37-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12		
5/16	18-20-24-28-32	1-1/4	7-12-16-18	2	4-1/2-10-12

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NOTE: Oversize, Undersize, Metric, 64th and 32nd Size Taps Available for Quick Delivery. We stock Special Sizes in High Speed Milling Cutters, Slitting Saws, End Mills and Reamers.

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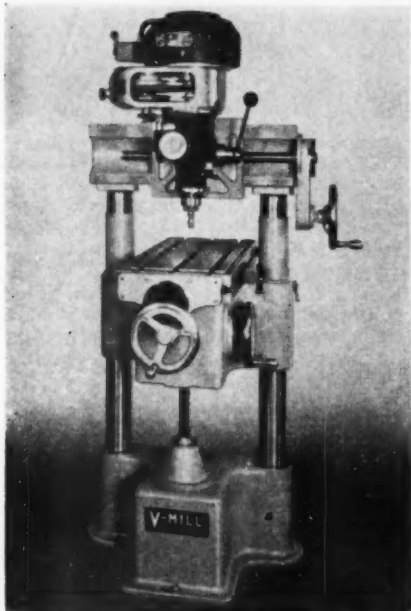
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High capacity V-mill

Precision, range and ease of operation together with high capacity are advantages claimed for the new Pierce-West V-mill which is being distributed by Lodding Inc., Dept. N-67, 82 Beacon St., Worcester, Mass.

Controlled, smooth acting motion in all three dimensions, together with vertical angularity with positive approach



and locking, are cited as features. The table measures 14" x 36", has a 20" travel. Clearance between rods is 17½". The head has a 16" cross travel and a 17" vertical travel. Spindle travel is 4". Distance from table to spindle ranges from 0 to 21". Height of table from floor is adjustable from 27" to 44". Overall height of the machine is 71". Eight speeds can be obtained ranging from 120 to 3500 r.p.m. Quill travel is 4".

Use ACTION Card, opposite page 64. Encircle No. 28

New control for portable grinder

Faster, handier control has been built into the improved Nu-Jett 100,000 rpm. grinder by its makers, the Nu-Jett Products Co., Dept. B, 1355 Michigan N.E., Grand Rapids, Mich.

The new control is a small flat lever

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

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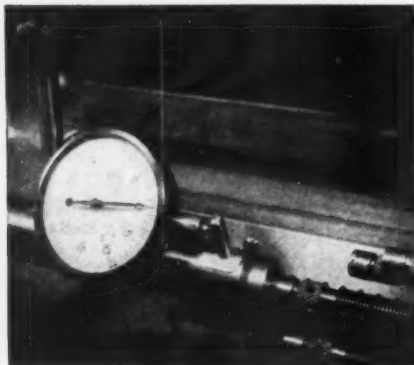


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POSITIVE Stop Attachment

*for any turret lathe
having multiple stop roll*



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• Particularly suitable to W & S, J & L and Gisholts. Be sure to specify make and model. *Guaranteed to hold to .001 on any lateral dimension from face off to steps, grooves, etc. Eliminate human element of feel.*

Saves time on set-ups and between shifts. Exceptionally accurate and fast on re-work. Chrome plated and case hardened for longer life.

\$29.50 F.O.B. LOS ANGELES, CALIF.

LESS INDICATOR

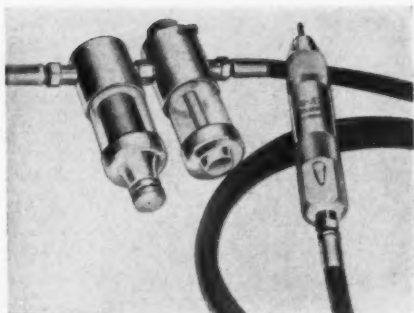
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Dealer Inquiries Invited

One Thousandth Stop Co.

P. O. BOX 2217

VAN NUYS, • CALIFORNIA



at the connection end of the grinder. This handle works an air shut-off valve built into the tool. A quarter turn completely opens or closes the valve. Partially opening the valve gives varying speeds up to the maximum of 100,000.

The Nu-Jett is only $\frac{7}{8}$ " x $5\frac{1}{2}$ " and weighs five ounces. It can etch, grind, polish, deburr. Its speed makes it especially adapted to carbide burrs.

Use ACTION Card, opposite page 64. Encircle No. 29

Flexible sleeve for taper shank drills

Pilot Tools, Inc., Dept. BB, 225 Lafayette St., New York 12, N.Y. has announced its new "Pilot" flexible sleeve with Morse taper which is claimed to permit taper shank drills, reamers, end mills to be used regardless of broken or



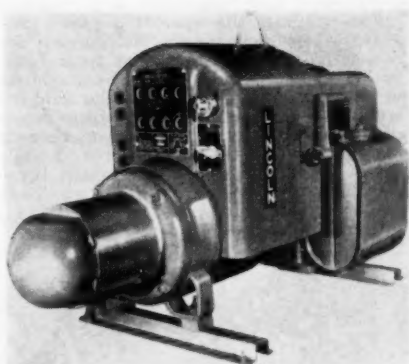
worn tangs. The sleeve is made of spring steel and grips the tool firmly along the full length of the taper with increased surface contact.

When fully engaged the sleeve adapts itself to any surface irregularities around the tool and inside the spindle of the machine, becoming as one solid assembly. To disengage, only a twist of the wrist is needed, regardless of how tightly the drill and sleeve may be wedged together. Therefore, it, reportedly, does not score or mar the shank of the tool. The flexible construction assures sleeve concentricity and thus simplifies the job of regrounding drills, reamers or other tools with broken tangs.

Unit comes in sizes from 1 to 5 and with Morse tapers from 1:2 to 5:6. It is also available in two types—Type A (universal) for tools with or without broken tangs, and Type B for those with broken-off tang only. It is recommended for heavy duty work, such as automatic feed. Use ACTION Card, opposite page 64. Encircle No. 30

Combination welder and power unit

A combination welder and auxiliary or standby power unit features large capacity and simultaneous output of both



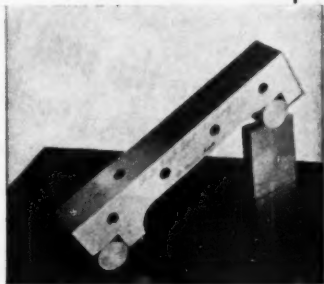
welding and auxiliary current. The Weld-anpower machine, developed by the Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio, is rated as a 200 ampere welder and a 4 KVA continuous duty power unit. For intermittent standby power, it is rated at 5 KVA.

The unit is an AC alternator powered by a 12 hp gasoline engine. Accurate voltage control of output insures efficient operation of electrical equipment. Normal voltages are held constant re-

Guaranteed Accuracy at Low Cost

5" Sine Bar\$18.50
5" Sine Plate\$32.50
10" Sine Plate ...\$80.00
 (Solid Oak Case Extra)

These precision ground sine tools are accurate to .0002" in center distance and parallelism, for the length of the tool. Convenient tapped holes and sturdy end plates make setups easy.



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 or SEND YOUR
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 Immediate
 Shipment!

Number	Center Distance	Width	Shipping Weight	Price with Oak Case
1605	5" \pm .0002"	3"	7 lbs.	\$38.00
1610	10" \pm .0002"	5"	23 lbs.	\$86.00
1705	5" \pm .0002"	1"	3 1/2 lbs.	\$21.75

Write for FREE Handy Table of Constants



Bald Eagle Tool Company

Newton Building, St. Paul 1, Minn.

ardless of load variations, it is claimed.

For welding, the operating panel provides taps which supply AC current for use with electrodes ranging from 5/64" to 3/16" dia. In addition, a heat control is used to raise or lower the current from any one tap to suit requirements of the welding job. A continuous current range from 20 to 200 amperes is thus provided for welding, hardfacing, brazing, heating and soldering. For auxiliary power, the panel provides a 230 volt outlet and four outlets for 115 volt power.

Use ACTION Card, opposite page 64. Encircle No. 31



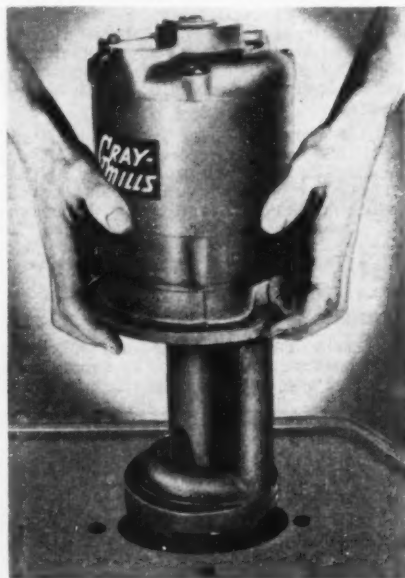
How easy can you get? If you can hold a wrench and a screw-driver you can put a new seat in a SMITH'S REGULATOR in just a few minutes time. No special tools—no special skills—no long delays. That's why experienced welders pick SMITH'S REGULATORS.

SMITH WELDING EQUIPMENT CORPORATION

Dept. MTBB-91, 2633 S.E. 4th St., Minneapolis, Minn.

Compact coolant pump

The new H-6000 Series immersion type centrifugal coolant pump recently introduced by Graymills Corp., 3712 N. Lincoln Ave., Chicago, embodies space saving possibilities combined with big pump performance. Although of compact design, it delivers 17 gals. per minute at 12 ft. head with water. The pump is claimed to handle liquids, even containing abrasives, through a wide range of vis-



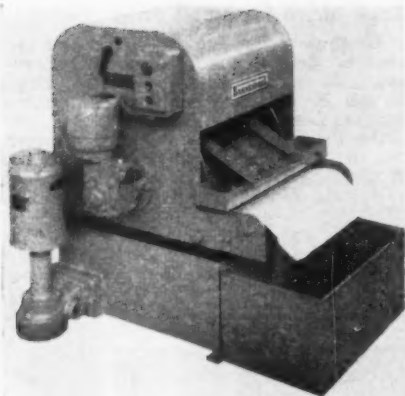
cosity with ample reserve horsepower to prevent overloading the motor to cause pump failure.

There is no pipe necessary below self-mounting flange; discharge pipe is above mounting flange. The H-6000 Series comes in two standard immersion lengths—6½" and 8½". There is no metal to metal contact between moving parts and the shaft and moving parts are enclosed and protected by the pump casting.

Use ACTION Card, opposite page 64. Encircle No. 32

Combination type filter

A combination magnetic and fabric tank type filter, Kleenall, for conditioning soluble oil coolants and mineral cutting oils, uses BarnesdriL magnetic separator drum combined in a distinctive way with a filtering area where the coolant passes through a fabric of specific porosity.



Four models of the unit are offered ranging in capacity from 15 GPM to 60 GPM based on water soluble coolants. Barnes Drill Co., 852 Chestnut St., Rockford, Ill.

Use ACTION Card, opposite page 64. Encircle No. 33

Portable arc welder features new type transformer

A portable arc welder weighing but 65 lbs. and operating on either 110 or 220 volts AC 60 cycles, with a rated output of 200 amps, is manufactured by Brennen, Bucci and Weber, Inc., and is available from Kasson Die & Motor Corp., Dept. BB, 32-14 Northern Blvd., Long Island City, N.Y.

Called the Bren/Weld portable arc welder and actually delivering 250 amps, it incorporates a new ultra high frequency transformer. The welder will braze, cut and preheat as well as weld steel up to and including 1½" thick. There are no



October, 1954



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your letterhead and
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16 page catalog

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CONICAL TOOL CO.

3801 Buchanan S.W.
Grand Rapids 8, Michigan

moving parts requiring adjustment.

Operation is shock free. Using new contact type electrodes, welds are made merely by dragging the electrode along the work. It is not necessary to maintain a definite arc with the contact electrode.

The unit handles electrodes from 3/64" up to and including 5/32", using either metallic or carbon arc process. Housed in a cast aluminum case, dimensions are approximately 11" x 12" x 7 1/2". It is supplied with seven feet of welding cables, electrode holder and ground clamps.

Use ACTION Card, opposite page 64. Encircle No. 34

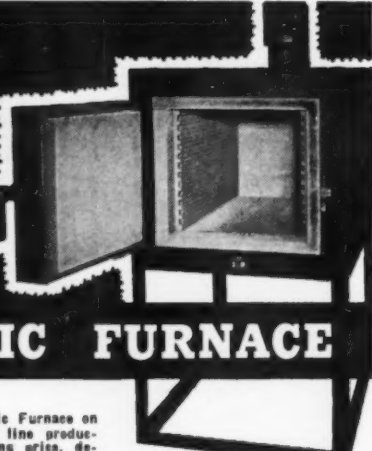
Angle drive for small drills

An angle drive, for small diameter extension drilling and reaming, is now available from the Beaver Tool Co., Dept. B, 622 E. Jerico Turnpike, Huntington Station, Long Island, N. Y.

The drive is quickly installed between the drill extension rod and any of the 79 standard size drill extension chucks of the Little Beaver 500 Series line, which fit all 1/4" drive chucks.

Beaver extension chucks, all of which fit the same threaded, 8 1/2" drill extension rod and feature a patented, anti-slip de-

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WAYS
WITH A
LUCIFER
ELECTRIC FURNACE**



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2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed. Lucifer controls are **EXACT**. They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed, long lived, trouble free. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 6x12"	\$ 467.00	\$ 548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
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Complete with 100% automatic electronic controls.

WRITE FOR FREE LITERATURE, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or phone today.

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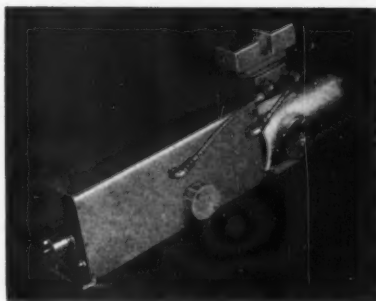
Neshaminy 1, Pa.

Phone Osborne 5-0411

Successors to Gilbert S. Simonski Company



"Special Machine Tool Builders"



Illustrated above is a Model 4M unit with spindle travel of 6" and 120 r.p.m. This unit has a 6½ second duty cycle.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

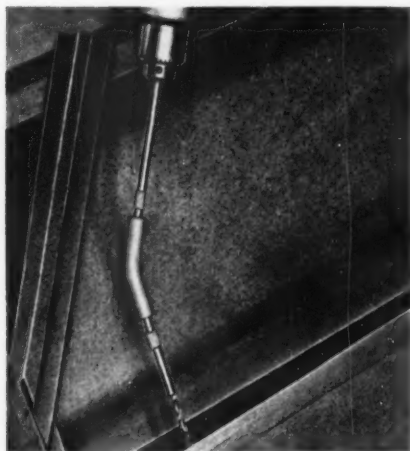
Do you want a compact, self contained wrench to operate gripping fixtures on your machines? If so, contact the:

FEN

MACHINE COMPANY

28914 Lakeland Blvd.

Box 274 Wickliffe, Ohio



helical fluted machine taper pin reamers, sizes 7/0 to 2/0 and 0 to 4, and for die makers taper pin reamers, sizes AAA. to M.

Use ACTION Card, opposite page 64. Encircle No. 35

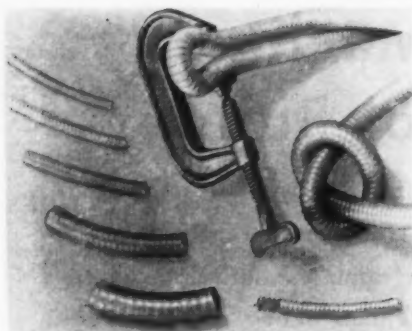
New type of industrial piping offers 4 advantages

Armourvin is a new type of industrial piping, made of translucent plastic. Its chemical make-up and its unique "moulded in" wire provide the designer and machinery manufacturer with a new solution to old problems, according to the manufacturer.

A 120 ton tensile helical steel wire is embedded in the wall keeping it from contact with any of the liquids or gases either inside or outside of the piping. This high quality wire makes Armourvin practically uncrushable, it is claimed.

Armourvin is extremely flexible. It will bend around a 5/16" dia. spindle without reducing its internal bore. It is extremely tough and resistant to water, oil, grease, most acids and alkalis, diesel fuel, coal and butaine gases and it will remain flexible and will withstand tempera-

sign, correspond to standard drill sizes. They are available in number sizes from No. 56 to No. 1, letter sizes from A to H and fractional sizes from 3/64" to 17/64" by 64ths. These chucks are widely used on lathes, drill presses, portable power and hand drills and are also available for



tures up to $+70^{\circ}\text{C}$ and as low as -40°C , according to Newage International, Inc., Dept. MB, 235 East 42nd Street, New York 17, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 36

New type rotary table

A rotary table capable of being revolved by the mere flick of a finger has recently been developed by the Giddings & Lewis Machine Tool Co., Dept. B, 142 Doty St., Fond du Lac, Wis. This Air-Lift rotary

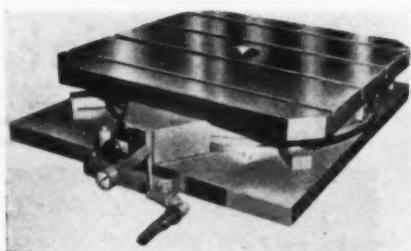


table is a self-contained unit claimed to be a time-saver when more than one surface of a workpiece is to be machined.

It contains a collapsible index pin which eliminates play or lost motion in the mechanism and compensates for wear. The plunger can be locked in the table and index block every 90 degrees for positive indexing. Graduations are used for positioning between these 90 degree intervals.

Use ACTION Card, opposite page 64. Encircle No. 37

Tapping screws with two balanced cutting edges

The Continental Screw Co., Dept. MTB, New Bedford, Mass., has announced three



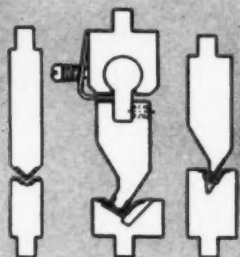
INDUCTION HARDENED PRESS BRAKE DIES

**for greater die life at no extra cost
on any make of press brake**

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO dies for your next press brake job.

4915

Steel Bending Brakes for over 50 Years

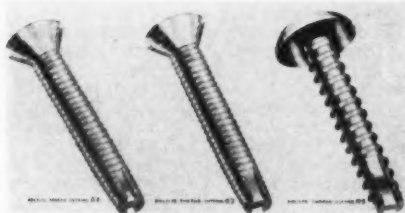


**Heavy lines
indicate
hardened surfaces**

DREIS & KRUMP
MANUFACTURING COMPANY

7440 S. Loomis Boulevard, Chicago 36, Illinois





new types of thread cutting screws with two balanced cutting edges. Other features claimed are wider flutes, greater

material strength, and vibration protection.

The three types are listed as: G2, left, for use in steels, alloy steels, and cast iron; G3, center, for die-casting use, in zinc, aluminum and other soft metals; H3, right, designed for low driving torque with high stripping torque for tighter fastening.

Use ACTION Card, opposite page 64. Encircle No. 38

Improved centerless grinder

An improved design of the No. 12 centerless grinder has been announced

It's the
WHOLE
Truth.....



Machine tool men "in the know" have long acclaimed the "US" Adjustable Multiple Spindle Drill Heads with their quick-change universal joint assemblies. They are built for continuous use, with full anti-friction bearing construction for high capacity thrust loads. The universal joint adjustable multiple spindle type is suitable for any sensitive drilling machine. Joints are self-lubricating.

The single eccentric type is used for equally spaced holes on bolt circles.

The new double eccentric AdjUSTafix, two to eight spindles, permits spindles to be located in non-symmetrical patterns. It eliminates expensive change in set-up.

Write for details on any type of universal joint adjustable head. Ask also about our totally enclosed gear-driven adjustable, fixed center, or individual lead screw tapping heads.

UNITED STATES DRILL HEAD CO., 618-618 Burns St., Cincinnati 4, Ohio

by Landis Tool Co., Dept. BB, Waynesboro, Pa.

Many of the production and operating features of the previous model have been retained. Improvements have been made to facilitate the addition of automatic cycles and loaders.

Workpieces of up to 3½" dia. can be ground on this machine using standard work rests. Heavy duty work rests increase the work capacity to 4¾" dia. The grinding wheels are 20" dia. and up to 8" wide. Regulating wheels are 12" dia. and up to 8" wide. A 15 hp motor

drives the grinding wheel.

The grinder is used for either infeed or thrufeed grinding of parts which may be more economically finished by centerless grinding than by center-type grinding. This machine can be used for either heavy stock removal or close tolerance work of straight or profiled shape.

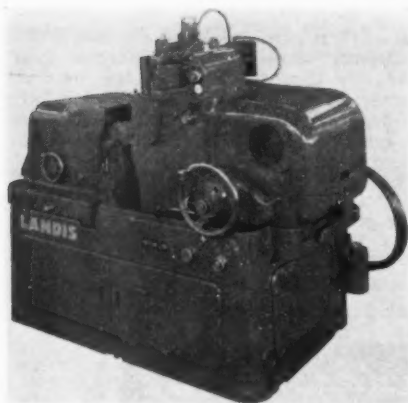
Among the major changes to the No. 12 centerless is the addition of pressure lubrication to the Microsphere spindle bearings of the grinding wheel head. The bearings are flood lubricated with filtered oil from a separate reservoir.

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2425 Wolcott St., Detroit 20, Mich.



This system has its own pump and safety pressure switch. Pressure must be built up in the circuit before the wheel drive motor will start. If pressure should fail, the drive motor will stop.

Also available on the improved centerless is hydraulic rapid infeed and slow grinding feed. This is especially desirable for high production infeed grinding

operations. The rapid infeed stroke is $\frac{1}{4}$ " and the continuous slow grinding feed is adjustable from zero to .100" on diameter. Rate of feed is also adjustable. This feed mechanism has been used in automatic cycles for continuous grinding of parts by the infeed method. The feed is initiated by moving a lever. An automatic cycle is thereby started for the complete grinding operation.

Use ACTION Card, opposite page 64. Encircle No. 39

Small bore gages

Dial bore gages for as small as $\frac{3}{16}$ " and $\frac{1}{8}$ " bores are announced by Standard Gage Co., Inc., Dept. MB, Poughkeepsie, N. Y. Of the two new sizes, one, designated as No. 000, covers from $\frac{1}{4}$ " down to $\frac{3}{16}$ ", and the other, No. 0000, from $\frac{3}{16}$ " to $\frac{1}{8}$ ". Like the existing model covering $\frac{3}{8}$ " to $\frac{1}{4}$ ", both these new sizes employ the centering-size disc principle whereby a removable disc of nearly the bore size centralizes the head and at the same time serves as one of the contacts. The discs lock positively in position by means of a clamping sleeve and knurled nut.

These gages of newly lower ranges are being offered as either a "one-hole" gage

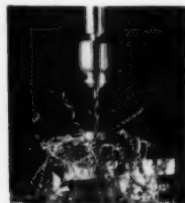


**SHALLOW HOLES...DEEP HOLES
DRILL THEM *FASTER,*
ALL *BETTER***

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DRILL CHIP BREAKER

- ✓ Small Chips Permit 50%—400% Increase in Drilling Speeds
- ✓ Drill 10 Diameters or More in Depth Without Clearing Drill
- ✓ Better, Smoother, More Accurate Holes

Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour. Your nearby COMMANDER Distributor has the Drill Chip Breaker and other Commander Production Tools.



Ordinary Chips



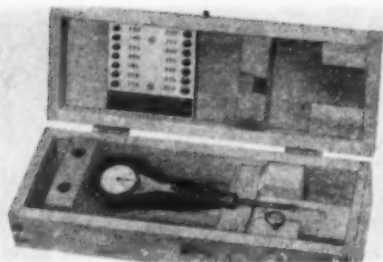
Chip Breaker Chips

Commander MFG. CO.

4227 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Write FOR
CATALOG #851
*which describes Commander's
Production Tools*

SEE US AT BOOTH 1309, NATIONAL METAL SHOW, CHICAGO



to suit the user's specified dimension and tolerance, or as a general-purpose gage for any dimension within the over-all range. In the latter case, the gage is furnished with a set of centering-size discs mounted on a plate in the container, the size of each disc being plainly marked. There are 14 such discs for the No. 000 gage and 27 for the No. 0000. By attaching the proper disc, it is possible to measure any particular bore dimension with a tolerance up to plus or minus .002".

Use ACTION Card, opposite page 64. Encircle No. 49

GILMAN *Standard* SLIDE ASSEMBLIES

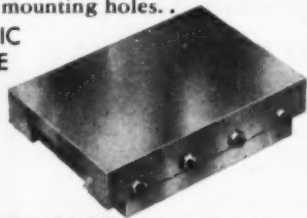
ASSEMBLED TYPE



... SPEED BUILDING OF *Special* MACHINES

ASSEMBLED TYPE includes male and female members, gib and adjusting screws, return springs, stop screw, end shield and mounting holes. .

BASIC TYPE



BASIC TYPE includes male and female members, gib and adjusting screws.

Reduce designing and manufacturing time on your *special* production machines with these *standard* slide assemblies. Ample stocks assure good delivery.

- Available with sliding surfaces either *machined* or *hand scraped*.

- 52 types and sizes. *Widths* from 2" to 6"; *lengths* from 3" to 16"; *travel* from 3/4" to 4".

- Manufactured to the highest standards of precision and quality.

Write Now for **FREE Literature**

RUSSELL T. GILMAN, Inc.

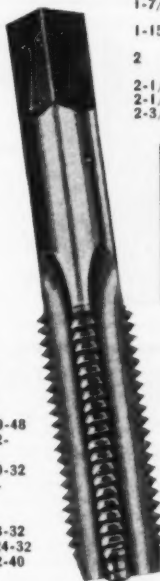
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Special Taps

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IMMEDIATE
SHIPMENT

HIGH SPEED RIGHT HAND TAPS

SIZE	THREAD
4	32-48-60-64
5	30-32-36-48-80
6	36-40-48-56-60
7	32-40-48
8	24-30-36-38-40-44-48
9	24-28-32-40-48
10	28-30-36-40-48-64
12	20-28-32-36-48
14	20-24-28
1/16	60-64
5/64	36-48-72
3/32	48-56-60
7/64	48-56-60
1/8	32-40
5/32	32-36-40-48
9/64	36-40-48
11/64	36
3/16	20-24-32
13/64	32-36-48
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40-48
5/16	16-20-22-27-28-32-36-40
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-36-47
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-16-20-24-26-27-28-32
13/16	10-14-18-20-27-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24-36
1-5/8	5 1/2-8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24



SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4 1/2-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16

SIZE	THREAD
2-1/4	4 1/2-8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24

SIZE	THREAD
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1-11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
2	4 1/2-10-12

LEFT HAND AND SPECIAL DIES IN STOCK

PRICES ON APPLICATION
NEW SIZES ADDED FREQUENTLY

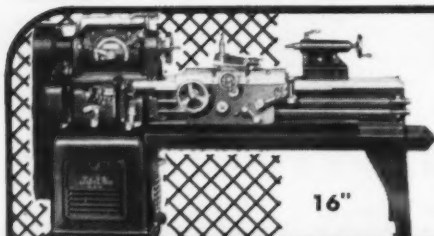
NOTE: Oversize taps. Special size reamers. H. S. extension drills. H.S. Taper length drills No. 1 to No. 60—Letter sizes A. to Z. Fractional sizes 1/8" to 1/2", 12" Overall 9" flute length. H.S.S. aircraft drills 6" and 12" long.

We Specialize In High Speed Cutting Tools
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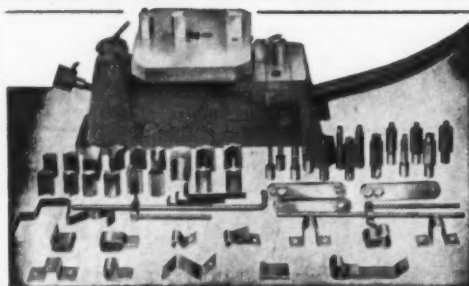


CARROLL AND JAMIESON LATHES

• This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

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THE CARROLL & JAMIESON MACHINE TOOL CO. SATAVIA, OHIO, U.S.A.



Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{3}{4}$ " x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{1}{4}$ " x 4".

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to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.

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TRADE  MARK

CLOSED

OPEN

Plain Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING & MFG. CO.

1110 E. 87TH ST.

CHICAGO 19, ILL.

Offset Type

CONTINUOUS HINGES

SPECIFICATIONS:

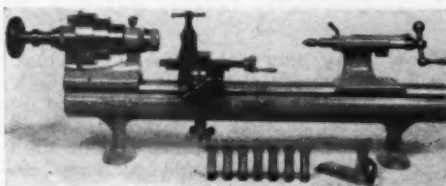
Open width $\frac{7}{8}$ " to 6"

Gage Material .040 to .123

Pin Diameter .101 to $\frac{3}{16}$ "

Lengths to 120"

SEMI-OFFSET



STARK No. 3 1/2 Lathe, 32" bed, Cone Bearing Headstock, Screw Tailstock, Compound Slide Rest, Tip-over Hand Rest, Collets 1-64" to 1/2" by 64ths.

The originators of the American Bench Lathe, Stark has been building quality bench lathes for over 92 years. You can depend on Stark.

"Stark" TOOL COMPANY

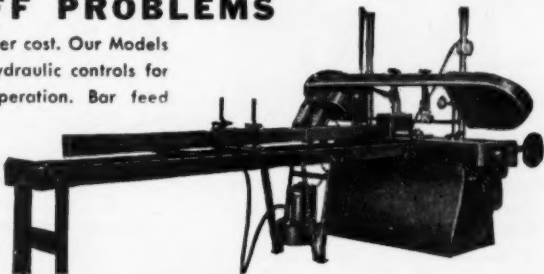
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SOLVE CUT-OFF PROBLEMS

Do a REAL job—faster and at lower cost. Our Models M, D, and J feature simplified hydraulic controls for both full and semi-automatic operation. Bar feed (shown here on Model M), other accessories, and hinge-type saws also available. Write for literature.

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ALSO METAL STAMPINGS OF ALL TYPES

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HIGH SPEED or CARBIDE

FACING TOOLS

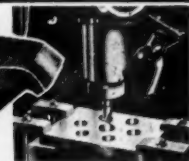
**FOR HOLES FROM
1/16" UPWARD
17 DIFFERENT SIZES**

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For MASS PRODUCTION

- CONSTANT CLEARANCE
- CONSTANT SHAPE OF CROSS SECTION
- EASY RESHARPENING
- CONVENIENT TO USE
- LONG LIFE



Dealers! Here's a Profit-Maker!

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..... cut weld cleaning time by 85%



MONEY-BACK TRIAL OFFER
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors or fumes.

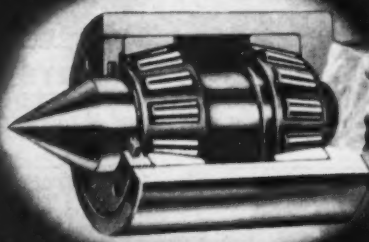
P-O-M No. 2. Non-inflammable, non-toxic, water soluble paste. Inorganic. Thin before applying and start welding at once. \$3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.30 per gallon, f.o.b. Dayton.

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G. W. SMITH & SONS, INC.
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for
lathe and grinder
tail stocks

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.



FREE BULLETIN 105

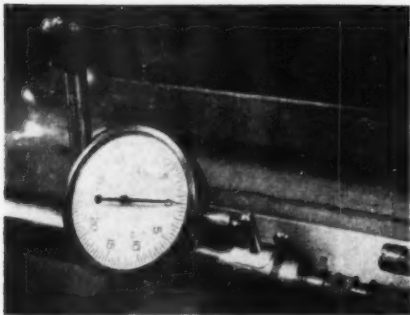
"What you should know about LIVE CENTERS"

FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

.001 stop attachment for turret lathes

A stop attachment for turret lathes that is claimed to hold to .001 on any lateral dimension from face off to steps, grooves, etc., has recently been announced by the One Thousandth Stop Co., Dept. B, P.O. Box 2217, Van Nuys, Calif.

Of case hardened steel, chrome plated, the stop is only $4\frac{1}{2}$ " long. Spring loaded, it tends to kick off power and hand feed into readable dimensions; easily attached to the master stop of turret lathes having



multiple stop roll. By eliminating the human element of feel, operator tension is eased. The stop will repeat consistently on the mean. Best results are obtained from a .0001th indicator ($\frac{1}{2}$ " travel).

Use ACTION Card, opposite page 64. Encircle No. 41

Swivel base machine vise

The Chicago Tool and Engineering Co. recently announced the addition of a new model to the Palmgren line of machine vises. The new Palmgren No. 60B flanged milling machine vise with swivel base is precision built and constructed for heavy-duty service, such as milling, drilling, grinding and other machine operations which require a rugged holding device.

The 60B is provided with flanges for clamping down to the machine table and may be used with or without the 360° graduated swivel base. The swivel base is equipped with two bolt lugs for clamping to the machine and is also furnished with two $11/16$ " keys and screws to fit machine table slots.

The vise has jaws 6" wide, opens 6" and has a jaw depth of 2". Removable ground steel jaw plates are provided and the heavy Acme thread adjusting screw is equipped with a screw bushing that

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Direct-Reading
CHAMFER
Micrometer
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Accurately, Directly, Reads End Diameters
Of Chamfers Up To 1". TWO MODELS—
From 0° Chamfer To 90° and 90° Chamfer
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Chamfer Depths Easily Computed

• Reads like any
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Saves time, reduces
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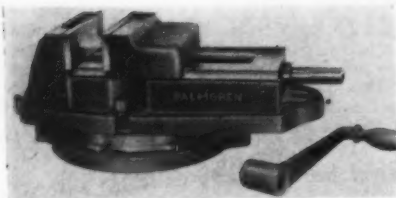


ACME
INDUSTRIAL
COMPANY

210 N. Laffin
Chicago 7,
Illinois

Simple
To Use

MFRS. OF STANDARDIZED DRILL, JIG AND FIXTURE BUSHINGS



can be replaced. Chicago Tool and Engineering Co., Dept. B, 8382 South Chicago Ave., Chicago 17, Ill.

Use ACTION Card, opposite page 64. Encircle No. 42

Pyro introduces new Micro-Optical pyrometer for precision temperature measurements

The Pyrometer Instrument Co., Dept. B, Bergenfield, N.J., has announced the development of an entirely new type of optical pyrometer—designed particularly for precision temperature measurements in the laboratory yet sufficiently portable to be used for general plant applications, it is claimed. Known as the Pyro Micro-Optical pyrometer, it has been developed to meet the demand not only for higher

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RED-E

CAM ACTION GRINDER DOG

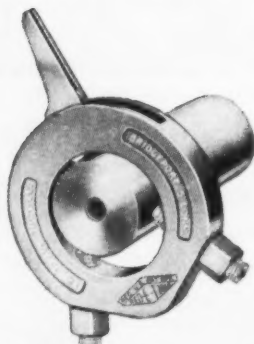
Features

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BRASS SCREWS

**to PROTECT
THE SURFACE OF
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Capacities $\frac{1}{8}$ " to 4"

Designed to save time and work —
make rapid changes. Positive Grip **ALWAYS**.

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RED-E TOOLS

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degrees of accuracy but also greater versatility in the measurement of temperatures over 700°C. (1300°F).

It is a multi-purpose instrument capable of measuring targets less than .001" in diameter, and, by means of supplementary lenses, can be adjusted for focal distances varying from 5" to infinity. Mountings on table-top and floor type tripods are available and the vernier worm gears permit extremely fine vertical and horizontal adjustments of the telescope. The optical system includes a

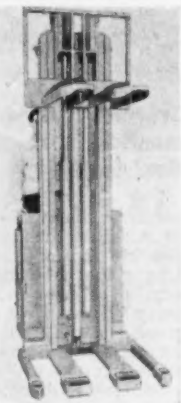
microscope type ocular providing a 20 power magnification of the object under measurement with wide scale direct-reading meter.

Use ACTION Card, opposite page 64. Encircle No. 43

Narrow aisle electric fork truck

The Raymond Corp., 37-120 Madison St., Greene, N. Y., has developed a new model narrow aisle electric fork truck for warehouse operations.

It is a modified straddle truck with four base legs; 5" x 2" load wheels straddle the pallet while the 7" wide elevating forks lower over another set of base legs with dual 5" x 2" wheels. This arrangement is said to provide for maximum stability at ele-



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vated heights up to 158" and insures against excessive wheel and floor wear. Furthermore, the truck has excellent turning characteristics and can right angle stack pallet loads from aisles only 6 ft. wide, thus reducing waste storage space to a minimum.

The truck is for use with skids, open face or 4-way entry block type pallet where high lifts are required. The block type can be handled also on all four sides by a hand pallet lift truck.

Use ACTION Card, opposite page 64. Encircle No. 44

Graymills introduces coolant feed manifold with off-and-on coolant flow feature

The Graymills coolant feed manifold recently announced for applying coolant to multiple drilling operations is said to provide better coolant application for longer tool life and save time by ending nozzle adjustments. It can be easily mounted on most standard 4 or 8 drill heads, as the split ring design makes it unnecessary to remove drill head for installation.

Coolant is directed to the point of the drill. Eight removable, adjustable nozzles



are supplied with the manifold, but it is so designed that it can accommodate up to 16 nozzles if desired. Nozzles can be removed in 15 seconds. They are made

SV 102 SCHAUBLIN

toolmakers' lathes
for those who
demand the ultimate
in precision

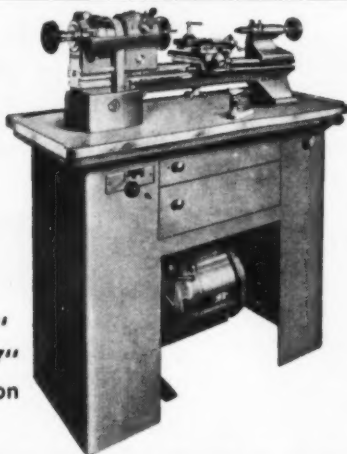
The SV 102 { Height of Centers 4"
Distance Between Centers 17"

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Largest
Selection of
SWISS
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Tools in U.S.

HIRSCHMANN

CARL HIRSCHMANN COMPANY, INC., 30 Park Avenue, Manhasset, N. Y.
Branches: Chicago, Detroit, Los Angeles
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of standard copper tubing.

As drill head moves up the nozzles move out of the way and coolant stops flowing. As head comes down and drilling starts—coolant flows automatically. Graymills Corp., Dept. B, 3705 N. Lincoln Ave., Chicago 13, Ill.

Use ACTION Card, opposite page 64. Encircle No. 45

Power chuck unit, quick exhaust valve

The Skinner Chuck Co., Edgewood Ave., Dept. B, New Britain, Conn., is introducing a new power chuck unit, the

Skinner "Junior," which is claimed to enable small lathes to operate with economy and production speed formerly available only on larger machines.

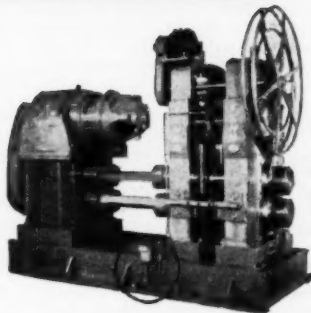
With a minimum of simple machining, this unit is said to be adaptable to almost any small lathe with 1" to 1 3/8" hole through the spindle.

Light in weight, it is precisely balanced to minimize spindle bearing and braking loads; work can be chucked internally or externally with accuracy.

Gripping capacity from 1/4" to 6"; 1/4" jaw travel exceeds the capacity of any

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FOR KNOW HOW**

Your RUTHMAN GUSHER COOLANT PUMPS




give you

Illustrated is a Fenn No. 121 Two High Roller Bearing Rolling Mill equipped with a Model S-P3 Long Gusher Coolant Pump.

- 1 Experience in Design . . .** Ruthman Gusher Coolant Pumps were first in their field and have maintained their leadership over the years. Ruthman engineers are constantly at work to bring you an even better Gusher Pump.
- 2 Precision Built.** Only tested materials and the best workmanship go into your Gusher Coolant Pumps. You can be sure of a long trouble-free life.
- 3 Efficient Operation** is inherent in Gusher Pumps. You get split-second coolant flow and they require no priming or packing.

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He's one of hundreds of traveling MALL salesmen whose mobile tool "warehouses" are equipped for on-the-job demonstrations. He will be only too happy to demonstrate any of the hundreds of MALL tools you want to see in action. There are forty MALL Service Warehouses, coast to coast. Phone or write the one nearest you—or any of the thousands of MALL stocking dealers—or our Chicago home office for a free demonstration without obligation.

THE BIGGEST ASSORTMENT OF POWER TOOLS OFFERED BY ANY MANUFACTURER

The MALL line includes many types and sizes of: Small Electric Drills—Heavy Duty Electric Drills—Portable Electric Saws—Gasoline Chain Saws—Bench Grinders—Electric Chain Saws—Electric Polisher-Sanders—Electric Screwdrivers—Electric Impact Wrenches—Flexible Shaft Machines—Portable Pneumatic Saws—Pneumatic Chain Saws—Pneumatic Grinders—Pneumatic Drills—Pneumatic Polishers—Pneumatic Sanders—Pneumatic Screwdrivers—and MANY OTHERS!



MALL TOOL COMPANY

PORTABLE POWER TOOLS

Gasoline—Electric—Air

7742 S. Chicago Ave., Chicago 19, Illinois

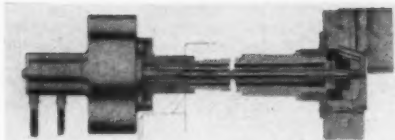
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Address _____

MTU-123



collet; valuable on second operation production work where rough or finished holding diameters may vary beyond a single collet's ability to grip.

The electric valve division also announces the V5-3 "quick exhaust" valve that is said to increase the operating speed of small air and hydraulic cylin-



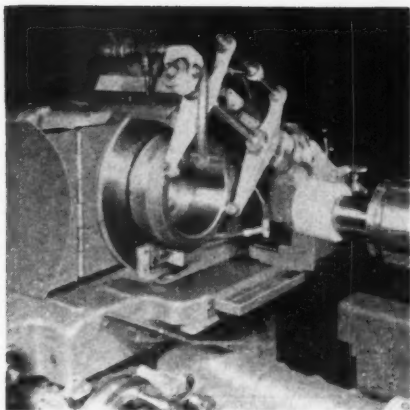
ders by more than doubling the speed of the cylinder return stroke.

The $\frac{1}{8}$ " dia. "quick exhaust" orifice is controlled by utilization of pressure differentials. Almost all V5-3, three-way normally closed valves can now be equipped with this built-in device.

Use ACTION Card, opposite page 64. Encircle No. 46

Centerless internal grinding fixture

Bryant Chucking Grinder Co., Dept. B, Springfield, Vt., announces the introduction of a new shoe-type centerless internal grinding fixture, now available as tooling on Bryant machines. This new fixture is claimed to ensure bore grinding to uniform wall thickness and concentric-



city held as close as .0001" or less. Roundness and straightness of the ground bore depend on the accuracy of the work piece's outer surface and the squareness of the locating face.

Straight and taper holes, and plunge-ground contours can be ground. Outer surfaces can be cylindrical, conical, or other surfaces of revolution as long as tolerances are held.

Use ACTION Card, opposite page 64. Encircle No. 47

Special ball seat gage

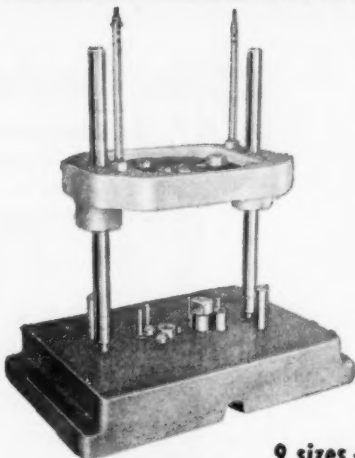
Shown is a special ball seat gage made by the Brown & Sharpe Mfg. Co., Dept. B, Providence, R. I., to check the dimensions of the ball seats on the forward mounting struts on airplane engines which must be held to very accurate tolerances in manufacture. The gage provides a very accurate check of the inside diameter of the ball seats in ten-thousandths of an inch, it is said.

In use, the gaging dimension is transferred to the dial indicator by an auxiliary plunger which rides on a cone at the back end of the gaging point. The gaging point is held



Zagar Self-clamping DRILL JIGS

**NOW STANDARDIZED for
DRILLING, REAMING, TAPPING**



**9 sizes —
5 combinations per size — for
hole patterns 3" through 15" dia.**

Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".

Write for Bulletin B-10.

**ZAGAR TOOL, Inc., 24000 Lakeland
Blvd.
Cleveland 23, O.**

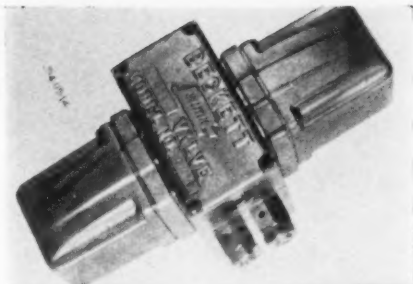
Zagar TOOLS For
INDUSTRY
and SPECIAL MACHINERY

against the working surface by means of a spring and the auxiliary plunger also is held by a spring firmly against the gaging point.

Use ACTION Card, opposite page 64. Encircle No. 48

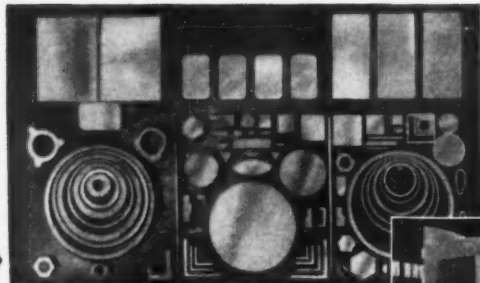
Manifold-type Hi-cyclic valves permit easy replacement of critical parts

Beckett manifold-type Hi-Cyclic operating valves for automation or other control setups feature manifold construction which permits rapid replacement of all



Campbell Abrasive Cutters

International Nickel
Uses **CAMPBELL ABRASIVE CUTTERS**
for wide variety of fine cutting operations



With exception of strip plates and sheet stock, these pieces of Monel* were cut by International Nickel on CAMPBELL Abrasive Cutters. Largest is approximately 10" dia. These same CAMPBELL machines cut stainless, alloy and other steels difficult to cut.



Model 480 CAMPBELL Abrasive Cutter at work in International Nickel warehouse, cutting "K" Monel, * 4 1/4" in dia. Time of cut—two minutes. This model will handle material up to 8" square

Cutters available in fully-automatic and semi-automatic models. Send for Bulletin DH-301 on CAMPBELL Abrasive Cutting Method.

* Reg. Trade Mark International Nickel Co., Inc.

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**Wet and Dry
Cutters and
Nibblers**

critical parts, including the valve body and spool assembly, without disturbing the piping or the main manifold block. Electrical valve models also have a built-in junction box and quick-disconnect electrical connections. Solenoid coils can be removed without disturbing the electrical circuit. All electrical leads are channeled from a $\frac{1}{2}$ " NPT size conduit outlet located at the base of the valve.

Valves are available for air or other non-corrosive gas, and oil or water hydraulics. Valve types include 3-way, 4-way, two or three position, in $\frac{1}{8}$ ", $\frac{1}{4}$ ",

$\frac{3}{8}$ ", $\frac{1}{2}$ " (modified) nominal NPT sizes. Use ACTION Card, opposite page 64. Encircle No. 84

Tapping attachment for high speed tapping of small holes

The Swedish-built No. 142 tapping attachment distributed by Homestrand Corp., Dept. BB, 9 Addison St., Larchmont, N. Y., was specially designed for high speed tapping of small holes.

Unit is said to be machined to very close tolerances, thereby eliminating eccentricity and achieving a vibration-free

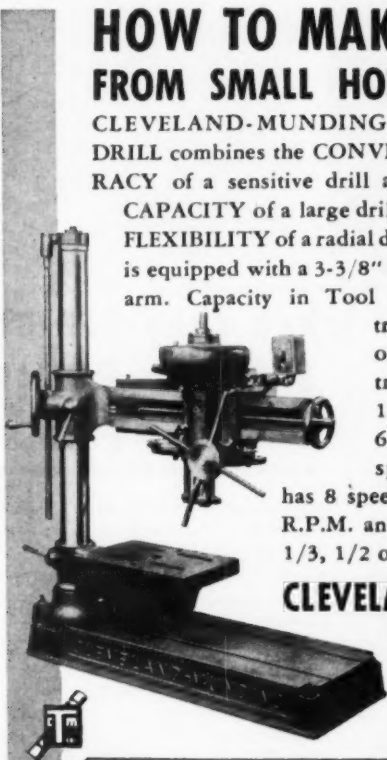
HOW TO MAKE PROFITS FROM SMALL HOLE DRILLING!

CLEVELAND-MUNDING BENCH RADIAL DRILL combines the CONVENIENCE and ACCURACY of a sensitive drill and the RANGE and CAPACITY of a large drill with the SPEED and FLEXIBILITY of a radial drill. The Bench Radial is equipped with a 3-3/8" dia. column, has a 24" arm. Capacity in Tool Steel—1/2". Vertical

travel of arm on column of 25" and horizontal travel of head on arm of 18". Spindle travel of 6-1/8" and #2 M.T. in spindle. The spindle has 8 speeds from 160 to 3140 R.P.M. and is equipped with a 1/3, 1/2 or 3/4 HP Motor.

CLEVELAND-MUNDING BENCH RADIAL DRILL

Write today for Folder No. BB-104



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tapping machine co.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC. • CANTON 6, OHIO



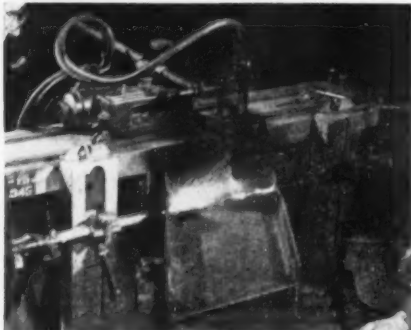
motion. The reversing, after a completed hole, takes place without jerks.

Rotation stops instantaneously when the bottom of a hole is reached. Upper and lower halves of the attachment are individually balanced and guided by individual ball bearings.

Use ACTION Card, opposite page 64. Encircle No. 49

Steel-cutting machine uses three torches

A structural steel-cutting machine that is claimed to attain record speed by means



of three acetylene-oxygen torches that cut heavy structural steel on all sides simultaneously to any bevel within 1/32" has been announced by the Luria Eng. Co., Dept. B, Bethlehem, Pa. The machine cuts wide steel beams in less than two minutes.

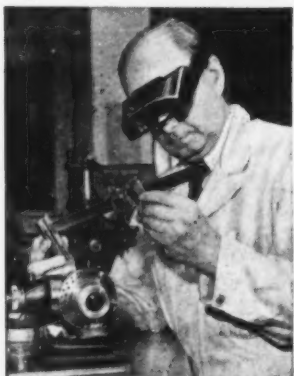
Use ACTION Card, opposite page 64. Encircle No. 50

Surface and immersion type pyrometers more rugged - manufacturing costs cut 30%

A new line of immersion and surface



People work better when they SEE BETTER



At Western Electric's Kearny Works

the MAGNI-FOCUSER is used in the mechanical laboratory for reading fine calibrations.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

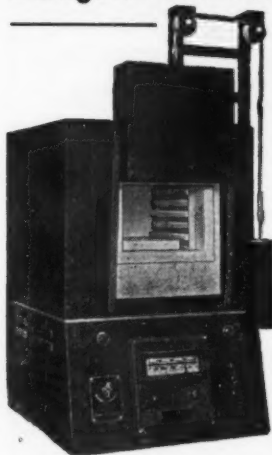
Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

EDROY PRODUCTS CO.

480 Lexington Ave.,
Dept. 14, New York 17, N. Y.

Designed for TOOL ROOM EFFICIENCY



HUPPERT Heat Treating FURNACES

Range: 300° F. to 2000° F.

Years of satisfactory operation in tool, die and machine shops, as well as laboratories have proven these furnaces to be ideal for production work. Huppert special features include High Temperature, Heavy Duty Kanthal elements—Multi-insulation—counterweighed and tight self-sealing door. Pilot lights indicate furnace operation. All connections factory installed, shipped ready for operation.

Model No.	Inside Dimensions			KW	Prices 220 volt single phase	
	Wide	High	Deep		with Huppert input controller	with electronic temperature controller
869	8"	6"	9"	4	\$280.00	\$480.00
11	8"	6"	12"	4	287.00	487.00
12*	8"	8"	12"	6	367.00	567.00
12A*	8"	8"	18"	9	471.00	671.00

*For 2300° F. add \$95.00 to No. 12 and \$105.00 to No. 12A. No. 12A can be furnished for 3 phase at no additional cost. For floor model add \$50.00 to above prices.

*Write for literature on complete line of furnaces and ovens.

K. H. HUPPERT CO.

6845 Cottage Grove Avenue

Chicago 37, Illinois

Manufacturers of Electric Furnaces and Ovens

type economy pyrometers has been announced by the Pyrometer Service Co., Inc., Dept. B, 348 River Road, North Arlington, N.J. Simplified design and engineering and more ruggedness and durability are claimed.

New features include: Extra-heavy high temperature transite tip on the button type surface pyrometer that is practically accident proof; extra rigid handle and arms.

Available in four models, the No. 22-B is the button type surface pyrometer; the No. 22-R is the roll type of revolving surfaces; the No. 22-H is the hypodermic type for soft material; the No. 22-I is the immersion type of molten metals such as bronze, brass, aluminum, zinc, magnesium, etc.

Use ACTION Card, opposite page 64. Encircle No. 51

Miniature clutch series

The Formsprag Co., Dept. MB, 23601 Hoover Rd., Van Dyke, Mich., announces a new series of miniature clutches for overrunning, backstopping, and indexing. Four models are available with all the features of the full complement sprag principle. According to the manufacturer,



the clutches have been standardized to meet industry's demand for small size clutches of high torque capacity, low price, long life, and minimum maintenance. Standard bore sizes are 1/4", 3/8", and 1/2".

Use ACTION Card, opposite page 64. Encircle No. 52

**Micro
Supreme**
**LAY-OUT AND
IDENTIFICATION DYE**

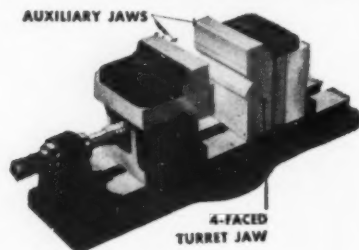


7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

**MICHIGAN CHROME &
CHEMICAL COMPANY**
8615 Grinnell Ave. • Detroit 13, Mich.

SAVE SET-UP TIME



Brown Turret-Jaw Utility Vises cut production costs by eliminating time wasted on "rigging" set ups. It improves work quality because of rugged construction and ability to hold work tightly.

For complete specifications and prices write for Bulletin 23B, Brown Engineering Co., 126 N. 3rd Street, Reading, Pa.

BROWN UTILITY VISES



Of particular design, easily and quickly measures distance of projections, depth of holes, etc.

Its features:

Solid head, hardened, ground and lapped.

Two Verniers, to obtain otherwise difficult measurements.

Compact design to permit the use of 1" scales.

Accurate machine divided graduations.

Furnished with case in 1" to 12" size scales—18", 24" and 36" also available. Prices on application.

A necessary tool in every tool crib and mechanic's tool box.

WM. A. KOENIG

108 Mt. View Ave. Troy, New York
Telephone Ashley 2-8631

Standardize on

hall COLLET CHUCKS

for
**SPEED,
ACCURACY,
ECONOMY**



Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments. All grip . . . no slip. No bearings . . . no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Two Sizes to Fit Your Requirements:

Model A . . . 1" (max. capacity 1-1/16")

Model B . . . 2" (max. capacity 2-1/16")

Round, square or hexagon collets, plain or serrated

No. 3 Collet Pads Now Available

Write today for illustrated catalog and price list—Dept. A-12

HALL MANUFACTURING COMPANY

627 TULAKOSA DRIVE, LOS ANGELES 26, CALIFORNIA

Faster SPINDLE ALIGNMENT



On tapping and reaming jobs, the Ziegler Floating Tool Holder speeds the making of set-ups because it automatically compensates for alignment inaccuracies, even though they amount to as much as 1/32" radius or 1/16" diameter.

The man-hours a Ziegler Holder saves will pay for it several times over in a short time.

W. M. ZIEGLER TOOL CO.
13570 Auburn, Detroit 23, Mich.

Ziegler
ROLLER
DRIVE
FLOATING HOLDER
for Taps and Reamers...

• WRITE FOR CATALOG •

PORTABLE ELEVATING TABLE



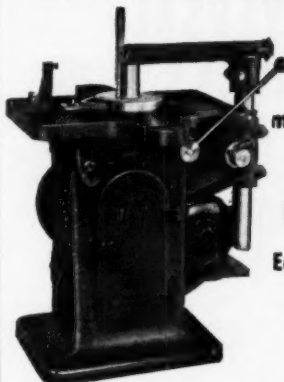
**Saves
TIME
and
LABOR**

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height from 31" to 46½", leaving operator's hands free. Table swivels and locks in any position.

SEND TODAY FOR ILLUSTRATED CATALOG NO. 2

THE MIDWEST TOOL & ENG. CO.
112 WEBSTER ST., DAYTON, OHIO

"DAVIS" KEYSEATERS



are
moderately
priced
Efficient
Economical
Durable

Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO.

407½ Exchange St. Rochester 8, N. Y.

Multiple Spindle Magazine Feed Power Screw Driving Machines



Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.

Part Feeder

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.



COOK & CHICK CO.

640 SOUTH MILLER ST.
CHICAGO 7, ILLINOIS

UNIVERSAL CHUCKS

save time
save money



- low first cost, due to simple design.
- wrap-around gripping action eliminates scored tool shanks.
- precision manufacturing assures tools running true.
- sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ ", shanks to fit any type machine.

Standard Collet Chucks for a wide variety of applications.

Floating Chucks for reaming and tapping.

Coolant-Fed Chucks for deep hole drilling.



**UNIVERSAL
ENGINEERING COMPANY**
FRANKENMUTH 10, MICHIGAN

173-B

Stop and Shop at Rivett's production corner

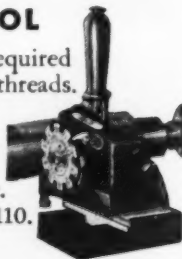
DRAW-IN COLLETS

Stocked in all standard styles...checked 25 times against master gauges...guaranteed to run "dead true" at collet mouth. Write for Bulletin 100.



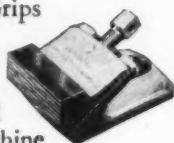
THREAD TOOL

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.



LOCKJAW

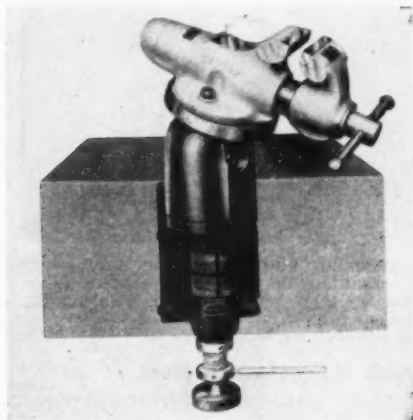
Set-ups stay put! Grips both downwards and sideways...eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.



RIVETT LATHE & GRINDER, Inc.
Dept. MTBA10
Brighton 35, Boston, Massachusetts

Wilton announces heavy duty hydraulic PowRarm

The Wilton Tool Mfg. Co., Dept. B, 925-941 Wrightwood Ave., Chicago 14, Ill., has just announced a new heavy duty hydraulic PowRarm with carrying capacity of 1000 pounds.



Other Wilton PowRarm positioners are already being used as fixtures for many production or assembly operations supporting the work firmly in any position.

Regular PowRarm models have had carrying capacities of 24, 70 and 150 lbs., respectively. The new heavy duty PowRarm increases maximum weight limits 700%.

Use ACTION Card, opposite page 64. Enclrele No. 53

Converging conveyor lines served by elevating table with revolving top

Material from conveyor lines of varying heights is received to be packed and sent along to the shipping room on another conveyor.

To solve the problem of providing an adjustable table that could be turned and elevated to serve several conveyor lines, engineers of The Raymond Corp. designed a round top for their standard table. The top revolves freely or can be locked in a single position. A 16 inch range of height is provided allowing the top to be fixed at any height between 28" and 44". Capacity is 2000 lbs.

The table is portable but can be held in position by a floor lock. Hydraulic elevation and lowering is controlled by

SLASH YOUR CARBIDE COSTS

Get as many as 36 cutting edges for the price of a comparable standard tool. Eliminate expensive handling and grinding by using the new "Throw away" length carbide.

More rigid than even brazed tools, the Flash holder gives amazing tool and insert life. A sketch of the clamping principle is shown at the right.

No more chipbreaker grinding. Carbide cuts cooler, lasts longer. Down time is reduced to the absolute minimum. Get these savings. Send for the new catalog.

The Flash Toolholder for
"Throw away" blanks in
negative or neutral rake

Flash

Carbide Tool Company

5311 W. DIVERSEY AVE. CHICAGO 39, ILL.



Ordering Washers?

Take advantage of these
SUBSTANTIAL SAVINGS

↓

by using Whitehead Stock Washer Dies.

1500 SPECIAL SIZE DIES ON HAND.

Whitehead makes washers and shims from any metal or special material to your specifications. Thickness from .002" to $\frac{3}{8}$ ".

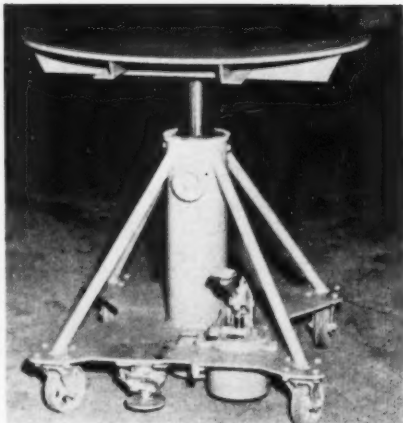
In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes. Write for Whitehead's Catalog.

54-3



**WHITEHEAD
STAMPING CO.**

1671 W. Lafayette Blvd.
Detroit 16, Michigan

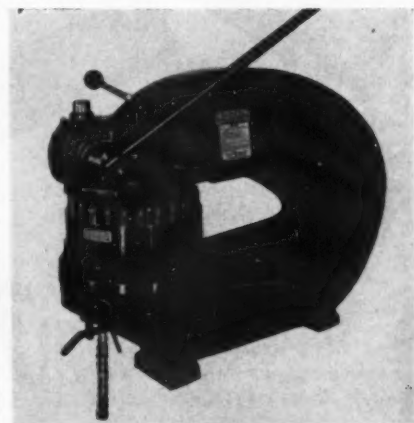


convenient foot pedals on the pump which is mounted on the base of the table. The Raymond Corp., 37-121 Madison St., Greene, N.Y.

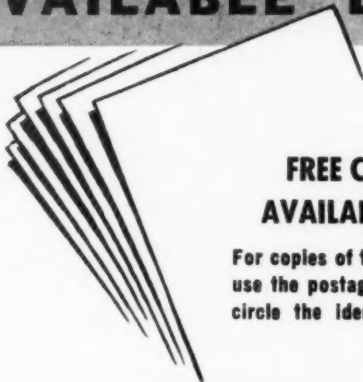
Use ACTION Card, opposite page 64. Encircle No. 54

Quick change punch press

A new 18 station rotary turret punch press that punches any shape hole is announced by Rotex Punch Co., Inc., Dept. B, 2350 Alvarado, San Leandro, Calif. The desired punch-and-die set is brought into position instantly by a rapid, manual turn of the turret, then locks into alignment. Punch-and-die sets can be made to designs or are available in scores of round or irregular shapes and sizes up to 2" in diameter. Punches metals, plastics, cardboard, fibreboard, leather and other sheet material.



AVAILABLE LITERATURE



FREE CATALOGS AND BULLETINS AVAILABLE FROM MANUFACTURERS

For copies of the literature in which you have an interest use the postage-paid postcard on the next page. Merely circle the identifying numbers and mail the postcard.

1. Reversible Plug Thread Gages. In which either end of each member may be used for gaging, are described in a 4-page folder by John Bath & Co., Inc., Dept. BB, 23 Grafton St., Worcester 8, Mass. Pin type gaging members can be readily adjusted for use as depth gages. Red and green locking nuts provide easy go and no go identification.

2. Adjustable - Torque Driver. Scully-Jones and Co., Dept. B, 1901 S. Rockwell St., Chicago 8, Ill., has issued a bulletin presenting Safe-Torque drivers, releasing, adjustable torque drivers for taps. Tap breakage, scrap and production losses are kept to a minimum, it is claimed.

3. Press Guards. A folder describing power press guards and accessories is being distributed by Searjeant Metal Products, Inc., Dept. BB-H, Mendon, N.Y. In the sweep-type guard, any downward action of the ram causes the guard arm to sweep across the working area of the press.

4. Power Chuck Fixture. Bulletin PCF67, the Skinner Chuck Co., Edgewood Ave., Dept. MTB, New Britain, Conn., presents their power chuck fixture, a non-rotating air operated work holding fixture for use on drilling and milling machines, for assembly operations and for other bench and machine installations.

5. "Facts About Zirconium" is a concise compilation of information about the history and production of zirconium. The

mechanical and physical properties, chemical properties, facts about fabrication of zirconium, such as melting, forging, rolling, welding, machinability, are discussed. The Carborundum Metals Co., Inc., Dept. BB, Niagara Falls, N.Y.

6. Small Businesses. New booklets available from the Superintendent of Documents, U. S. Government Printing Office, Dept. BB, Washington 25, D.C., are: "Care of Hydraulic Systems," "Know Your Patenting Procedures," and "The Foreman in Small Industry." The price of the latter is 20 cents.

7. Grinding Machines. Catalog AG describes the line of automatic precision rotary and surface grinding machines manufactured by the Standard Electrical Tool Co., 2486 River Rd., Cincinnati 4, Ohio. Solutions to actual grinding problems are illustrated, showing specific applications for each model machine.

8. "Machining Characteristics of Lead Steel and Free-Cutting Brass" is a 48-page booklet published by Titan Metal Mfg. Co., Dept. BBU-28, Bellefonte, Pa. Reports results of research laboratory tests on the two metals, as well as results of six-month production runs manufacturing booster bodies out of brass and leaded steel.

9. Twist Drills. A chart covering twist drill applications has been published by Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich. Gives recommendations as to the kind of drill to use in many

types of metals and materials. Six types of jobber drills are illustrated, as well as short length screw machine drills, short length power drills, etc.

10. Punches, Shears, bending brakes, dies and small tools are presented in new catalog of Whitney Metal Tool Co., Dept. B, Rockford, Ill. Illustrations, specifications, and prices augment the text. The 50-page booklet is designed to lie flat while in use.

11. "Selected AEC Reports of Interest to Industry," a new series of bibliographies compiled by the Atomic Energy Commission, may be purchased from the Office of Technical Services, Department of Commerce, Washington 25, D.C. Cost of the set is \$1.25, while costs of individual sections are: Chemistry & Chemical Engineering, 45c; Construction & Civil Engineering, Mining & Geology, 25c; Electronics & Electrical Engineering, 35c; Health & Safety, Industrial Management, 25c; Mechanics & Mechanical Engineering, 25c; Metallurgy & Ceramics, 35c; Nuclear Technology, 35c.

12. Air Control Valves. Three fundamental types of air control valves are described and illustrated in a 12-page booklet published by Ross Operating Valve Co., Dept. 1901, 120 E. Golden Gate, Detroit 3, Mich. The advantages of each type, an explanation of how they work, and a list of available standard models are included. Ask for Bulletin 101B.

13. Drilling Equipment. Drill head parts, broaching equipment, collets, and collet fixtures are reviewed in bulletin published by Zagar Tool, Inc., Dept. BB, 24000 Lakeland Blvd., Cleveland 23, Ohio. Any number up to 600 holes can be drilled at one pass with Zagar gearless drill heads. Heads can be adapted to existing drill presses, or can be developed as self-contained units.

14. Tube Cutter. Leaflet describes new precision tube cut-off machines. Henry A. Spittler, Dept. BB, 50 Church St., New York 7, N.Y., representative for Kieserling and Albrecht, Germany. Features claimed: compact design pipe and tube cutting, controlled cut-off lengths, and jamming of cutter feed eliminated.

15. Jig and Fixture Components. Specifications and illustrations of jig borer, rotary table and angle plate, universal col-

let chuck adapters, boring chuck and boring bar adapters are contained in an 8-page catalog from Amitool Co., Dept. MB, 629 Main St., Westbury, N. Y.

16. Grinding Machines. Colorful 16-page "X-Ray" story of grinding wheel spindle bearings is being offered by Cincinnati Milling Machine Co., Dept. BB, Cincinnati 9, Ohio. Booklet presents Filmatic spindle bearings in interesting and unusual manner and is well illustrated with diagrams.

17. Bearings and Bushings. New technical bulletin entitled "Anchoring Bearings, Bushings & Non-Moving Parts in Machinery" from Cerro de Pasco Corp., Dept. A, 40 Wall St., New York 5, N. Y. Company describes methods which have resulted in savings in time and labor for many firms.

18. Hand Broaching Machine. New Pioneer Model VH-215 hand broaching machine is pictured and described in 4-page folder available from Pioneer Broach Co., Dept. MB, 6434 East Telegraph Road, Los Angeles 22, Calif. Folder explains method of handling vertical pull broaching, also contains specification information of standard lines of broaches and accessories, and loose leaf price list.

19. Cams. Complete engineering and production data on Parker-built 3-dimensional cam which has 720 exact stations on only one square inch of surface is available from Parker Stamp Works Inc., 640 Franklin Ave., Hartford, Conn.

20. Hydraulic Slide-Lecture. An ambitious slide-lecture program to explain operation of hydraulic components has been completed by Denison Engineering Co., Columbus, Ohio. Slides are available to groups and companies.

21. Aluminum Alloys. New system of alloy designations for wrought aluminum and aluminum is announced by the Aluminum Assoc., Dept. MB, 420 Lexington Ave., New York 17, N. Y. Consisting of four-digit numbers, the new system is expected to meet all of the industry's present and future needs for wrought alloys. Booklet covering new system available.

22. Slide-Honing. Metals, plastics, castings and parts previously considered impractical to finish in tumbling machines are now successfully handled according to an illustrated folder from BMT Manufacturing Corp., Dept. MB, 110 E. 9th St., Elmira Heights, N. Y.

23. Gear Shaper and Cutting Tools. Bulletin (No. 1800-54) from Michigan Tool Co., Dept. BB, 7171 E. McNichols Road, Detroit 12, outlines in detail process for cutting gears, splines, cams, sprockets and miscellaneous external shapes.

24. Live Centers. New four-page catalog describes "engineered" live centers, designed by Sturdimatic Tool Co., 3902 F. St., Detroit. Specifications and prices of Standards which are made with Morse Taper are given.

25. Roll Forming Equipment. General Catalog No. 504 has been released by the American Roller Die Corp., Dept. B, Wickliffe, Ohio. Also available is insert sheet covering 35-ton press equipped with air clutch and air release spring-set brake.

26. The Training Job. Persons faced with business or industrial training problems are offered a free booklet, "The Training Job and How to Meet It" by the Cooperative Training Division, International Correspondence Schools, Dept. MB, Scranton 9, Penna.

27. Sheet Steel Separator. Permanent magnetic, self-contained sheet steel separator which requires no electrical or air connections is the newest development of Durant Tool Supply Co., 155-D Orange St., Providence, R. I. Folder states separator works on principle of inducing a magnetic field in the stacked steel sheets, causing them to separate from each other.

28. Tool Production. A new condensed catalog (No. 22) is now available from Northwestern Tool & Engineering Co., Dept. BBB, 118 Hollier St., Dayton 3, Ohio. Catalog has 341 items with dimensions, prices and other pertinent information.

29. Jig Borer & Electronic Milling Machine. Two booklets from Pratt & Whitney 22 Charter Oak Blvd., West Hartford, Conn., feature: new jig borer with two carbide bits which allow it to make full use of its horsepower for rapid metal removal machining; new electronic airfoil milling machine, model 102, is described and illustrated in 8-page, two-color folder.

30. Safe Feeds and Speeds Chart. Helpful chart issued by Chicago Latrobe, Dept. BB, 26 Fitch St., East Norwalk, Conn. is 8 3/4" x 11 1/2" in size, shows drill diameters and safe feeds for cast iron, bronze, brass, drop forgings annealed, drop forgings heat treated, steel castings and mild steel.

31. Adjustable Hollow Mills. Catalog No. 54 from Genesee Manufacturing Co., 562 Hollenbeck St., Rochester 21, N. Y., provides picture, diagrams and specifications of adjustable hollow mills for cutting steel, and cast-iron and non-ferrous metals, facing and counterboring tools, and special production tools.

32. A New Type Machine Tool. Up to six different drilling and tapping operations at a single station described in illustrated bulletin from Howe & Fant Inc., Dept. BB, 26 Fitch St., East Norwalk, Conn. Company states new tool does for drilling what modern turret does for turning.

33. Hardness Tester. A comprehensive and illustrated catalog giving engineering data, uses, design features of Rockwell hardness testers has been issued by Wilson Mechanical Instrument Div., American Chain & Cable Co., 937 Connecticut Ave., Bridgeport, Conn. Data included is on normal hardness tester, superficial tester, accessory and special tester, micro and micro hardness testers.

34. New Grinding Booklet. An informative 84-page booklet is available from Landis Tool Co., Dept. MB, Waynesboro, Penna. Seventeen chapters devoted to basic grinding facts as pertaining to cylindrical grinders and over 90 illustrations dramatize grinding operations.

35. Machining Steel Bars. Chemical composition, mechanical properties, and case studies showing production increases up to 72 per cent are described in a new bulletin from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill. Effect of lead addition on machinability, finish fabrication, heat treatment, and life of cutting tools is explained.

36. Knuckle Joint & Straight Side Crank Presses. Two catalogs covering E. W. Bliss Co., Dept. BB, Canton, Ohio, line of knuckle joint presses, ranging from 75 to 10,000 tons capacity in more than 40 standard sizes, and various S-1 straight side single crank presses with capacities from 50 to 400 tons. Detailed specifications and dimensions given.

37. Industrial Lubricants & Coolants. Tips on money-saving operations are contained in folder from S. C. Johnson & Son, Inc., Dept. BB, Racine, Wis. It explains how wax coolants eliminate final finishing step in manufacturing.

THIS HELPFUL LITERATURE NOW AVAILABLE

38. Chips Tell the Story. Just "why" and "how" broaching equipment is capable of producing parts accurately and at high speeds are explained in Bulletin C-54 by Colonial Broach Co., PO Box 37, Harper Station, Detroit 13, Mich. Comparisons are drawn between cutting action of single and multiple-point tools and broaching tools.

39. Industrial Rubber Products. V-belts, transmission and conveyor belts, all types of hose lines, molded products and the new Poly-V drive belts are described in new catalog from Raybestos-Manhattan Rubber Div., 61 Willet St., Passaic, N. J.

40. Metal Cleaning Equipment. A new carburetor and metal cleaner claimed to have no lingering disinfectant odor or uncomfortable skin burning sensation is described in catalog from Graymills Corp., 3712 N. Lincoln Ave., Chicago 13, Ill.

41. Electronic Gaging Equipment. Informative bulletin on Cleveland electronic gaging equipment for dimensional inspection and control applications in tool rooms, gage rooms, and production departments is available from Cleveland Instrument Co., Dept. BB, 735 Carnegie Ave., Cleveland 15, Ohio. Describes how combination of gage head and amplifier work together on standard stands or special stands or fixtures.

42. Industrial Cutting Tools. Several new products have been added to the line of Millit Inc., Dept. MB, 55 Flint St., Rochester, N. Y. Catalog includes new cutter widths, carbide slotting saw and inserted blade milling cutter line.

43. Impact Sockets & Universal Adapters. Extra large impact sockets, large size extensions and universal adapters, and Morse Taper conversion sockets are described in illustrated brochure by Apex Machine & Tool Co., Dept. BB, Dayton 2, Ohio. Specifications and drawings included for impact sockets with 1" female square drive, for use on hex nuts measuring up to 5 $\frac{3}{4}$ " across flats; similar provided for 1 $\frac{1}{2}$ " and 2 $\frac{1}{2}$ " female square drive sockets on hex nuts up to 10 $\frac{1}{2}$ ".

44. Circular Tools. Catalog N by Circular Tool Co., 765 Allen Ave., Providence, R. I., is complete revision of previous

catalog. Informative data on carbides and new Circoloy steel and slitting discs and knives is provided.

45. High Speed Steel Stock. A stock list for metal working industry has been released by Firth Sterling Inc., Dept. MB, 3113 Forbes St., Pittsburgh, Pa. Lists over 800 sizes in five grades of high speed steel. Bulletin No. SL-2077.

46. Thread Triangles. New development in thread measuring described by Montgomery Tools, Dept. BB, 7 Tichenor Lane, Newark 5, N. J. Features claimed: good for all standard threads; for all non-standard threads; on the machine; in the inspection dept.; on the outside job.

47. Layout Drilling Machine. Revised and expanded catalog available from Bryant Machinery & Engineering Co., General Sales Office, Dept. BB, 640 West Washington Blvd., Chicago 6, Ill. Machine has applications for precision work, not requiring tolerances closer than .001" per foot, and is especially suited for tools, dies, fixtures molds and similar work.

48. Facts about Zirconium. A concise compilation of information about history and production of Zirconium has been issued by the Carborundum Metals Co., Inc., Dept. MB, Niagara Falls, N. Y. Mechanical and physical properties, chemical properties, facts about fabrication of Zirconium such as melting, forging, rolling, welding, machinability are discussed.

49. Screw Assembled Products. The new 20-page reference bulletin on air powered screw drivers is available from Ingersoll-Rand, Dept. BB, 11 Broadway, New York, N. Y. It cites examples where air engineering speeds assembly of a variety of products. Time, labor, and cost-saving data are provided.

50. Control Valve. Bulletin 307 published by Ross Operating Valve Co., 108 East Golden Gate Ave., Detroit 3, Mich., gives description and illustrations of Ross rotary handle action or "Pancake" valve, a four-way valve, 2" high, with poppet type seals. Bottom ported base plates permit body removal without disturbing piping.

51. Instrumentation Inventions. A volume listing 775 government owned inventions in the field of instrumentation, with a

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brief description of each invention may be purchased at \$2.00 per copy from Office of Technical Services, United States Dept. of Commerce, Washington 25, D. C. These inventions are ordinarily available to the public on a royalty-free license basis.

52. Small Business Loans. The Management Aids for Small Business booklet, published by Small Business Administration, U. S. Dept. of Commerce, Washington 25, D. C., provides informative financing information for small commercial and industrial business.

53. New Straight Side Double Crank Presses are featured in a bulletin from Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y. Company states design improvement completely conceals driving mechanism, no overhanging flywheel, clutch, brake, intermediate shaft, or motor in rear of press to obstruct crane service.

54. Die Heads & Chucking Machines. New bulletin available from Eastern Machine Screw Corp., Dept. MMB, New Haven 6, Conn., describes H & G insert chaser die heads and Goss & DeLeeuw chucking machines. Layout drawings explain use of multiple die head set-ups.

55. Tapping. A four-page folder issued by Tapmatic Corp., Dept. BB, 845 West 16th St., Costa Mesa, Calif., describes these features: Lifetime, adjustable, spring-loaded, ball-type clutch; ball drive self-reversing feature; free axial floating action; produces threads as accurate as tap.

56. Universal Collet Stop. Brochure describes B. L. Knapp Industries, Dept. BB, 107 Franklin St., Syracuse 2, N. Y., collet stop for manual and automatic lathes, regardless of size, and universal ejector collet stop. Collet stop accommodates pieces within 5" of entire combined length of draw tube and collet. Price list included.

57. New Machinist's Tool. Hancock Manufacturing Co. Inc., Dept. MB, 1084 Martin Ave., Santa Clara, Calif., has issued folder illustrating a "Chuckollet" which is claimed will reduce set-up time and cut shop overhead, and make standard 5C (1/16" to 1") collets useful throughout shop.

58. Die Casting Compound. Folder issued by Fiske Brothers Refining Co., Dept. B, 129 Lockwood St., Newark 5, N. J., covers metal drawing compound applications, and nine brands with a brief outline of their description.

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59. Knife Grinding, Fly Shuttle Loom. Illustrated bulletin describes hand operated knife grinding attachment and brochure covers heavy fly shuttle wire weaving looms. Both issued by Mummert-Dixon Co., 122 Philadelphia St., Hanover, Penna. Grinder attachment is for No. 475 Plurality oilstone tool grinder and No. 479 combined oilstone grinder. Specifications and data supplied for looms.

60. Sliding Window Chart issued by Lebanon Steel Foundry, Dept. BBL, Lebanon, Penna., includes nominal analyses for Lebanon Circle Grades and comparable specifications of U. S. Military, Federal, American Society for Testing Materials, American Iron and Steel Institute, and Society of Automotive Engineer Steels. Also heat resistant cast alloys analyses.

61. Clamps, Chisels, Punches and Masonry Drills. A new 36-page catalog illustrates all Hargrave tools. It is available from The Cincinnati Tool Co., Dept. B, Norwood, Cincinnati 12, Ohio.

62. Stainless Steel Strip Calculator is being offered by Ulbrich Stainless Steels, Dept. BBM, Wallingford, Conn. Copyrighted calculator works on slide rule principle and is easy to operate.

63. Drilling Machine. A two-page descriptive bulletin covering the purpose and

specifications of new universal drilling machine has been issued by Hartford Special Machinery Co., 500 Homestead Ave., Hartford 12, Conn.

64. Automatic Drill Unit. A new unit with all necessary circuits built in and featuring simple mounting procedures, controlled feed and resistance drilling is described in a booklet from The Dumore Co., 1337 17th St., Racine, Wis. Booklet gives specification details on the unit relating to physical dimensions, motor control, capacity and lubrication.

65. Rotary Swaging Machines. The Torrington Company, Dept. BB, Torrington, Conn., has revised their bulletin and added a new swager die section which discusses designs and production of the dies.

66. Grinding Wheel Dressers. A 24-page catalog covering grinding wheel dressers and cutters from Desmond Stephan Manufacturing Co., 319 S. Walnut St., Urbana, Ohio, provides company's complete line, specifications, illustrations and tips on how to lower grinding costs.

67. New Tapers and Specification Chart available from Ready Tool Co., 550-B Iranistan Ave., Bridgeport 5, Conn. Chart consists of four separate sections; one each from Brown & Sharpe, Landis, Cincinnati, and Norton grinding machines.

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MACHINE and TOOL BLUE BOOK

OCTOBER, 1954

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35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
69	70	71	72	73	74	75	76	77	78							

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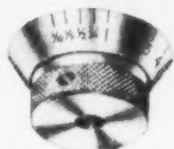
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NEW HERMES ENGRAVING MACHINE CORP.

13-19 University Pl., New York 3, N. Y.

Each section lists name of machine, large diameter of taper socket, taper length, taper per foot and taper designation.

68. Burners & Furnaces for hardening, tempering and annealing valves, torches, mixers, blowers and water warmers described in Catalog No. 55 by Johnson Gas Appliance Co., Dept. MMB, Cedar Rapids, Iowa.

69. Duplicating on Engine Lathes. Four-page illustrated leaflet describing new portable device for duplicating on engine lathes released by D. C. Caulfield Copy-

Master, Dept. BB, Manchester, Conn. Subjects discussed: duplicating of close tolerance intricate contours, including curve into curve and curve into angle; also describes engineering and template services available.

70. Automatic Air Feed. American Monarch Machine Co., Dept. MB, 1418 Millman St., Peoria, Ill., folder describes automatic air feed. Features claimed: feeds 12 layers of cardboard per stroke; feeds steel strip to piloted multi-stage die making thumb tacks; and feeds slippery, oily nickel-plated steel to .002" without pilots.



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71. New Grinding Coolant. Leaflet describes Triple C Grinding Coolant produced by Motch & Merryweather Machinery Co., Dept. MB, 1250 E. 222nd St., Cleveland 17, Ohio. Company claims coolant has no emulsifying action on oils or any deterrent effect on lubricated parts of machine; heat is dissipated and maximum cooling attained.

72. Cut-Off & Marking Tool. Features of a new dual-purpose marking and cut-off tool that operates from a single station of most automatic screw machines are described in a 4-page Bulletin, No. 700-54, from New Method Steel Stamps, Inc.,

Dept. MB, 147 Joseph Campau St., Detroit 7, Mich. Bulletin describes and illustrates various operational details. Typical application is shown with tool installed on an automatic screw machine for marking valve bodies.

73. Automatic Multi-Spindle Machine. The Bodine Corp., Dept. B, Bridgeport, Conn., offers a new catalog illustrating their 40-10 automatic dial-feed multi-spindle machine. Catalog covers design features, manufactured parts, case histories, operating instructions and maintenance information. Isometric, exploded, and silhouette drawings identify and illustrate both



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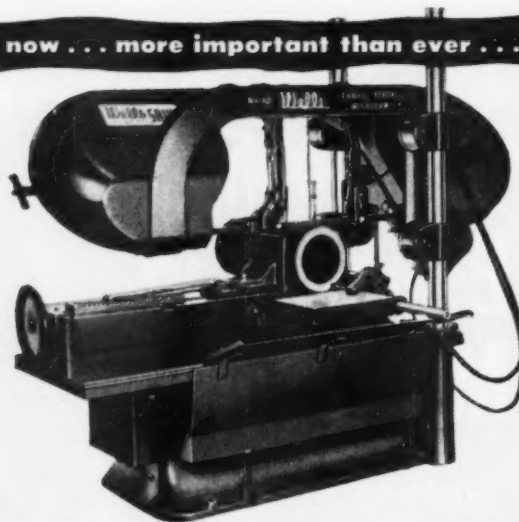
operation and parts.

74. Press Brakes. Informative Bulletin 89-C just issued by Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 11, N.Y., introduces new line of press brakes. Included are detailed specification tables for the 50 to 775-ton line, important fundamentals of press brake work and data for computing bending, punching and blanking tonnages.

75. Kroslok Face Milling Cutters & Shell End Mills. Two series, fine and extra fine,

have been added to Motch & Merryweather's Kroslok Line. An 8-page bulletin describes standard cutters in both series ranging in diameter from 3" through 24". Special cutters in diameters over 24" are also available. The fine series uses the standard Kroslok blade and wedge which are interchangeable within the respective body sizes of the fine series as well as the standard line of cutters. Motch & Merryweather Machinery Co., Dept. BB, Cutting Tool Manufacturing Div., 1250 East 222nd St., Cleveland 17, Ohio.

now . . . more important than ever . . .



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SEARCHING for a way to reduce metal cut-off costs? Here's an answer—the Wells No. 12 Saw. It's a heavy duty, hydraulically operated saw with automatic cutting cycle designed to step up production with greater accuracy. Capacity is 12" x 16", rectangular, 12 $\frac{3}{4}$ " dia., rounds. Ask your Wells Dealer for full information or write direct.



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METAL CUTTING BAND SAWS

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76. Guns for Air & Liquids. Four-page catalog contains dimensions, specifications and illustrations of Air-O-Check air guns, manufactured by Air-Way Pump & Equipment Co., Dept. BB, 1050 N. Kilbourn Ave., Chicago 51, Ill.

77. Drilling Machine. A catalog of the layout drilling machine developed by the Cleereman Machine Tool Co., an affiliate of Bryant Machinery and Engineering Co.,

Dept. BB, 640 W. Washington Blvd., Chicago 6, Ill., is now being distributed. This machine has many applications for precision work which does not require tolerances closer than .001" per foot.

78. Magnetic Chucks, Trueling Device. Folder describing Hagou permanent magnetic chucks, distributed by Sanford Mfg. Corp., Dept. BB, 1020 Commerce Ave., Union, N.J., is obtainable from distributor.

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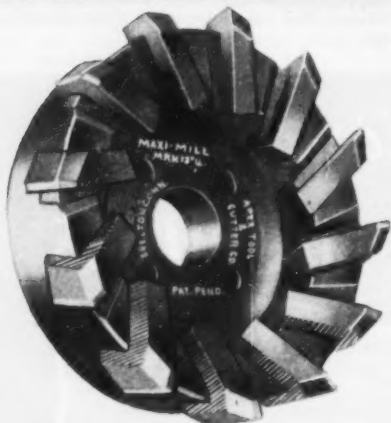
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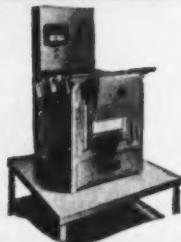
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or irregular shapes and sizes up to 2" in diameter. Punches metals, plastics, cardboard, fibreboard, leather and other sheet material.

Use ACTION Card, opposite page 64. Encircle No. 55

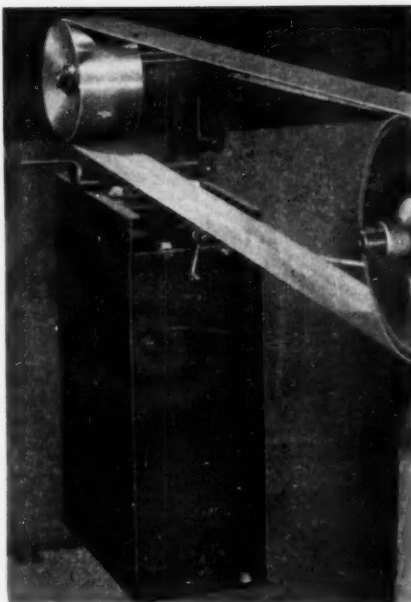
Backstand idler permits use of various diameter contact wheels

The "61" universal backstand idler, an attachment for all types of wall, bench and floor, coated abrasive backstand grinding and polishing operations, has been announced by the Coated Products Div. of The Carborundum Co., Dept. BB, Niagara Falls, N.Y.

Designed for heavy-duty production grinding, as well as for intermittent light polishing jobs which call for frequent setup changes, the unit permits belts of the same length to be employed with contact wheels of various diameters.

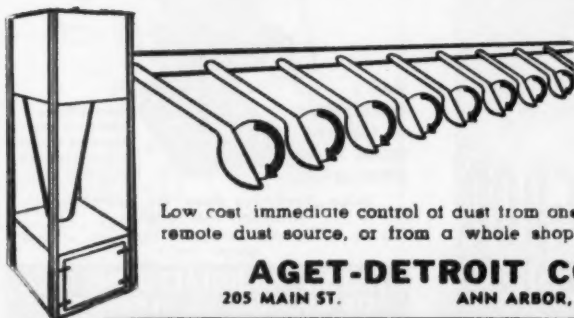
Varying widths of belts can be used, ranging from $\frac{1}{2}$ " to 8", due to a belt tracking mechanism and sensitive tension adjustments. The tracking device eliminates the need for precise center alignment between idler pulley and contact wheel, thus minimizing downtime during contact wheel change-overs.

Use ACTION Card, opposite page 64. Encircle No. 56



STOP DUST

with DUSTKOP



Low cost immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm
per unit (22 models)
standard, pre-tested,
available from stock.
Ask for catalog 605-2.
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205 MAIN ST. ANN ARBOR, MICH.

Rivet Spinning on the **LINLEY** is fast, low in cost and noiseless

Save time and money by putting your riveting on the LINLEY RIVETER. Send us samples of your work and we'll gladly and without obligation give you estimates on the time and cost of handling your work the LINLEY way.

Available in sizes and types for iron and mild rolled steel rivets up to 5/8"; larger rivets of softer materials can also be handled.

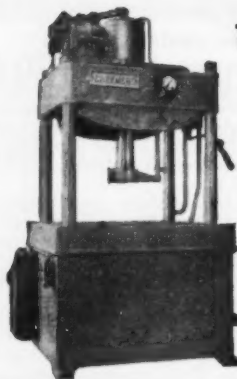


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PIONEERS
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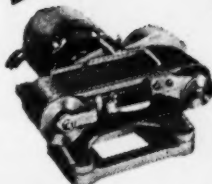
—head rivets from smallest to 1/2" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles.

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SIMPLEX-M ABRASIVE BAND GRINDER



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~~SPEED VISE~~
 is a fast production tool

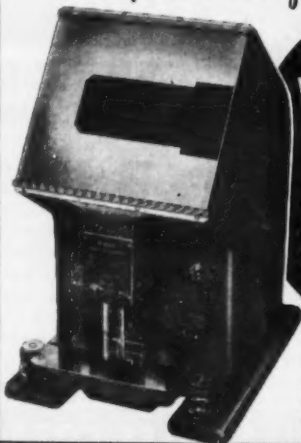
Here's a production set-up on a multiple spindle semi-automatic drilling machine that is really cutting manufacturing time and costs. The use of two Speed Vises eliminates the need for expensive and complicated fixtures and at the same time increases the production range. With Speed Vise it is only necessary to make a simple jaw plate to fit the parts being machined and to hold drill bushings, etc.

- ★ Quick action design for speed. Opens instantly to full capacity to handle work of any size.
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WILDER
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- Erect Image
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An Entirely New
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 Designed for
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**ACCURATE - FAST
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Promotes
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If you manufacture mass produced parts that are now being inspected or should be inspected on an Optical Comparator, the new Small Parts Comparator will enable you to inspect them quickly, accurately and economically at a surprisingly low per-piece inspection cost.

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Six Williams tool sets for lathes

Six "always ready" lathe tool sets provide for turning, boring, knurling, threading, cutting-off and side work with a minimum number of tools. High speed



cutters and wrenches are included in the strong steel case which is fitted with clips for the holders.

Each set includes three Williams turning tool holders with straight, right and left hand shanks, three cutting-off and side tools with straight, right and left hand shanks, one boring tool with sleeve bar, one threading tool with formed cutter and one knurling tool with one pair of knurls.

For lathes of 7" to 36" swing. J. H. Williams & Co., Dept. MB, 400 Vulcan St., Buffalo 7, N. Y.

Use ACTION Card, opposite page 64. Encircle No. 57

Variable speed drive offers wide range and high capacity

This new variable speed drive is of the countershaft type which varies speed by changing its location between two fixed sheaves. An important feature is the spring loaded belt face which maintains correct belt tension in all speed positions; full speed range of 9 to 1; standard V-belts used in both the 4" $\frac{3}{4}$ hp and the 6" $1\frac{1}{2}$ hp standard sizes.



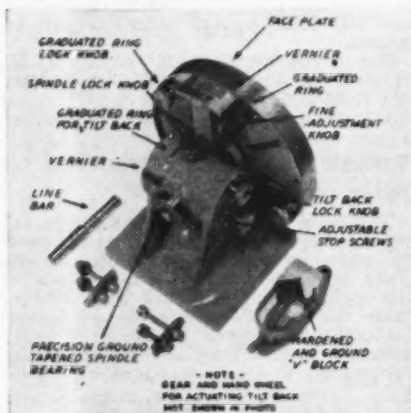
Engineered Live Centers

... A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

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Standard Equipment as shown includes "V" block and clamp, tee clamps, bolts and alignment bar with No. 3 Morse Taper to fit spindle.

Sized in 10" and 12"
Graduated in 5 minutes or
1 minute of 1°

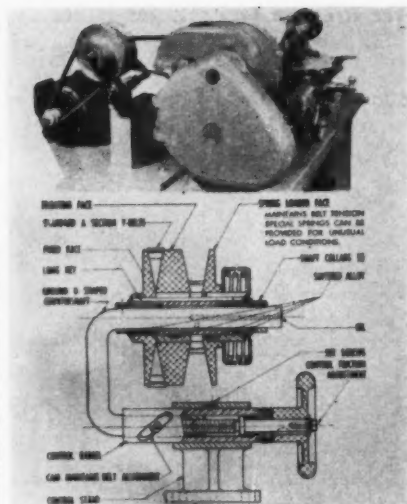
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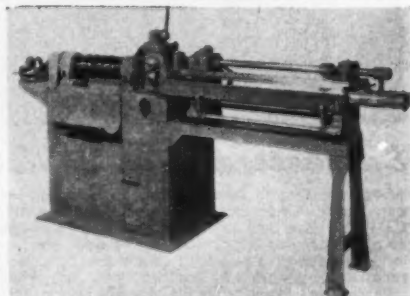
The hand control is located away from the belts and other moving parts for greater safety. The control adjusts the speed by swinging the countershaft in an arc around its base. It also moves the sheave positively along its axis to maintain belt alignment in both horizontal and vertical shaft applications. Speed Selector Inc., Dept. B, 118-U Noble Court, Cleveland 13, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 58

New type wire straightening and cut-off machine

A new type, high-speed rotary wire straightening and cut-off machine has been developed by the G. C. Patterson Machine Co., Dept. B, 3409 Trumbull St., Cleveland 15, Ohio.

It is said to be specifically engineered



WALTON TOOLS

TIME AND LABOR SAVERS FOR
MACHINE SHOPS AND INDUSTRY

WALTON TAP EXTRACTORS

Cut costs of
Removing
Broken
Taps

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads. In 2, 3 and 4 flute styles—sizes No 4 to 1½".



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Save Time and Labor
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Many holders in one. Head will swivel around an entire circle. May be set for straight, right or left hand offset positions. Will hold with perfect grip any size square or round tool bit or boring bar from ⅛" to 7/16".

"REPS" PIPE & STUD EXTRACTORS

Reduce Labor Costs
For Removing Pipes
Studs and Screws.



For removing broken pipes or studs that defy movement. "Reps" makes a strong four point grip without hammering or pounding. Hardened steel. Pulls rather than reams. In sizes, for every pipe from ⅛" to 2", every stud and screw from ¾" to 3½".

(*Reps. Tool Company, Inc., a Walton affiliate.)

Sold by leading dealers, or write direct for catalog No. 12 of Walton Tools and details of 30 day free trial offer.

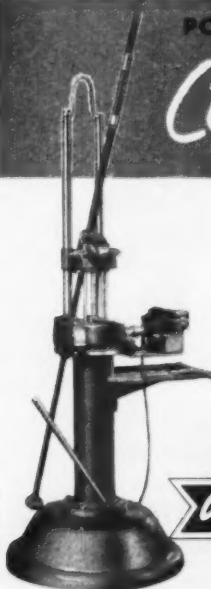
THE WALTON COMPANY, Hartford 10, Conn.

POWER SCRAPER

Cuts Production Costs...

5 HOUR JOB CUT TO 50 MINUTES

One manufacturer was scraping flat pieces measuring 18 by 24 inches . . . each piece requiring 5 hours to scrape by hand. An Anderson Power Scraper cut scraping time to 50 minutes! That meant a substantial saving in production costs and another happy Anderson customer. Let us help you estimate how much this portable, easy-to-use power scraper will save for you.



Today, Write for Bulletin 10-5

ANDERSON BROS. MFG. CO., Rockford, Ill.

to remove waves, bends and kinks from 1/16" to 1/4" dia. wire and to cut lengths up to 40" at the rate of 125 fpm. Extensions can also be furnished to cut lengths up to 12' or longer.

In operation, the wire is hand fed into a series of three-roll prestraighteners which directs the wire through the flyer or straightening arbor. The wire then enters a two-roll feed housing which feeds it into the guide bar where it is gauged and cut to length. Desired lengths are cut by a positive stop gauge which is automatically actuated by a release mechanism.

Use ACTION Card, opposite page 64. Encircle No. 59

Pocket comparator for measuring extremely small dimensions

The Pee Gee pocket comparator, a precision optical instrument distributed by National Tool Co., 11203 Madison Ave., Cleveland, is used to measure extremely small parts or minute dimensions on large parts. Measurements are accomplished through the use of a powerful magnifying lens (approximately 6 power) and tiny transparent patterns called reticles. These reticles are actually reductions of large master layouts. The Scales reticle, No.



103, which comes in the instrument, is used to measure dimensions from .0025 to .5 of an inch in steps of .0025 and 0 to .10 mm in steps of .2 mm. Other reticles are available for the instrument.

The comparator can be focused by sliding the eye piece further in or out of its Lucite body. Fine adjustment is accomplished through a built-in screw arrangement. A stainless steel spring, near the top of the body, holds a steel ball which keeps the instrument in adjustment.

Use ACTION Card, opposite page 64. Encircle No. 60

For Unvarying ACCURACY...

Standardize on ECONOMY

"TRU-LOC"

Adjustable Adapters & Nut

- ✓ CONCENTRIC
- ✓ GROUND ACME THREADED BODY
- ✓ "TRU-LOC" NUT — Lock in Any Position
- ✓ WOODRUFF KEYWAY — Relieved

All items in stock — immediate delivery assured. Write for latest Bulletin and Price List.



Economy

"TRU-LOC" Adapter Sleeves
A.S.A. Drill Jig Bushings
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— TOOL & MACHINE CO.

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... for EXTRA Capacity at
LOWER COST Check
STERLING GRINDERS



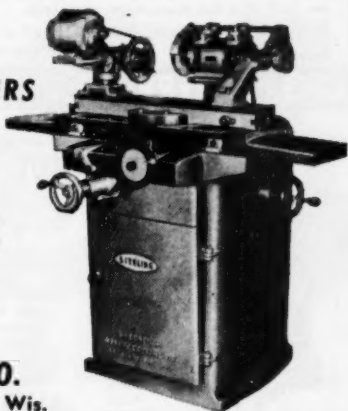
STERLING DRILL GRINDERS
take ALL drills $\frac{1}{8}$ " to $2\frac{1}{2}$ "
without chucks or collets.

**STERLING TOOL and
CUTTER GRINDERS** are
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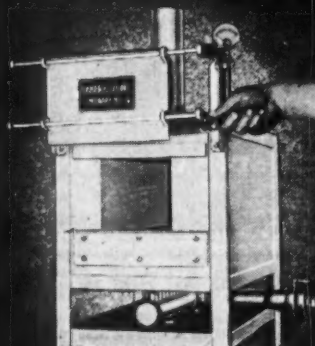
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1520 Galloway, Eau Claire, Wis.



FAST, ECONOMICAL HEAT!



\$180.00 Complete
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Model No. 2 Bench Type
Maximum Temperature 2000° F.
Heating Chamber 7" Wide,
12" Long, 5 1/2" High.

WHY USE LARGE EXPENSIVE HEAT-
TREATING EQUIPMENT FOR THOSE
SMALL JOBS THAT CAN BE DONE BET-
TER, FASTER and CHEAPER WITH A
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1500° F In 15 Minutes and 1900° F In One
Hour.

One Connection Only.

All Models Complete With Accurate Pyro-
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850 PASSAIC AVENUE
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GLARE out of
Micrometer
Reading

with the

"Lustro-Chrome" **MICROMETER**

MEASURE TO 1/10,000th

All graduations are well-defined black lines on dull chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from \$8.25 up. Ask for Micrometer Catalog



No. 901 C
0-1" Size

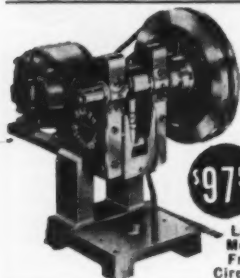
with **LOCK NUT** and
RATCHET and 10th
vernier
as shown

\$13.25

This tool with
TUNGSTEN CARBIDE
tipped
anvils **\$15.75**

GEO. SCHERR CO., INC.

200 MT LAFAYETTE STREET • NEW YORK 12, N. Y.



\$9750

Less
Motor
Free
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CUT COSTS with ALLEN Punch Press

1-Ton Power Bench Type.

Powerful, Dependable, Economical.

For light work—stamping, forming, riveting, etc.—metal, fiber or other material.

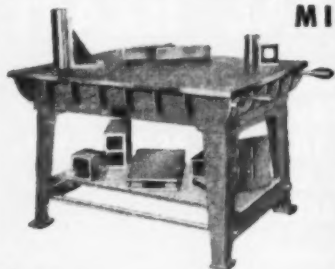
Overall height 17½" . . . Base size 8½"x8½" . . . Die Bed 5½"x8½"
Ram face 1½"x3½" . . . Ram Stroke ¾" . . . positive ¾" ram
adjustment . . . sturdy, single pin, non-repeat hand lever clutch
V-belt drive . . . weight 105 lbs. Requires only ¼ to ½ H.P. motor.

The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense.

30-Day Money-Back Guarantee. Order TODAY. Price \$97.50 F.O.B. Clinton, Mo. (Includes Motor bracket, V-belt, motor pulley, less motor).

ALVA F. ALLEN,

Dept. MTB, Clinton, Mo.



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THE KEYNOTE TO ACCURATE MEASUREMENT

Over twenty years of experience gives you "proved" performance -- added assurance of quality production. Milwaukee Surface Plates, Angles, Parallels and Straight Edges are all made of the highest quality semi-steel and finished to exact dimensions.

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Engineers and Machinists Since 1907

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So many standard styles . . . one must be just right for you!



For 66 years we have been producing metal-working tools and adding to our standard line. Today we have PUNCHES and DIES in a large range of round, flat, oval, and square sizes to fit most makes of punch presses immediately available from stock at regular low, standard prices.

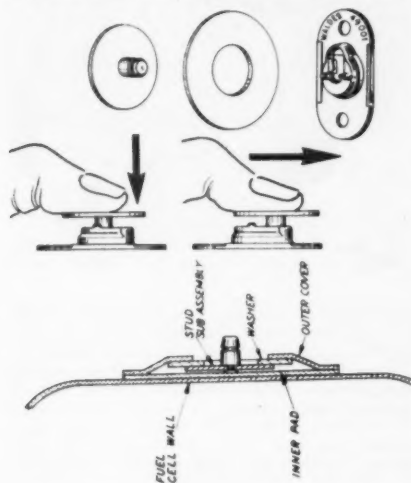
Send for our complete catalog sheets.

T. H. LEWTHWAITE MACHINE CO.

312 East 47th St., New York 17, N. Y.

Fastener attaches to surface without penetrating wall

A new snap-type fastener for holding airplane fuel cells in place without pierc-



ing the cell wall on installation has been introduced by Waldes Kohinoor, Inc., Dept. B, 47-16 Austel Place, Long Island City, N. Y., manufacturer of retaining rings, grooving tools and slide fasteners.

The device, called Positive Lock fastener, was developed in cooperation with the Aviation Products Div. of the Fuel Cell Department of the Goodyear Tire & Rubber Co. in Akron, Ohio. It consists of three major components: a stud sub-assembly, or "male" part, which is fitted to the outer wall of the fuel cell; an aluminum washer that acts as a bearing surface for the stud sub-assembly; and a housing sub-assembly, or receptacle, which may be riveted or screwed to any surface or structural member to which a part must be fastened.

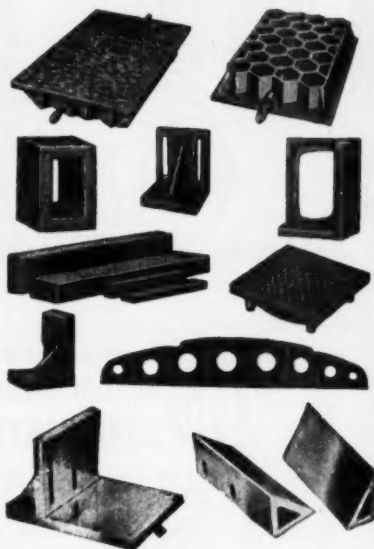
Use ACTION Card, opposite page 64. Encircle No. 61

High speed production press

Alpha Press and Machine, Inc., Dept. B, 9281 Freeland Ave., Detroit 28, Mich., has announced a 75-ton, high speed production press: maximum length of stroke 4"; maximum speed of 1" stroke, 300 per minute; 2" stroke, 200 per minute.

By means of an air clutch and brake

DEPENDABLE ACCURACY



INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

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71 W. Broadway, New York 7, N. Y.

**HOW TO
INSURE TOP
METALWORKING
PERFORMANCE
for only**

\$100



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CMD ANTI-SCORING
LUBRICANTS**

For top performance on lathe centers, grinding, press fit, stamping, die posts and many other operations—CMD ANTI-SCORING Lubricant can't be beat. It makes your operations smoother, faster, easier, and of course more profitable. Prevents scoring, seizing, galling... all bugaboos in modern machining work. This trial order will start you on your way to top performance where a high pressure lubricant is needed. You will be surprised to find how long it lasts. Get yours today in both oil and grease consistencies.

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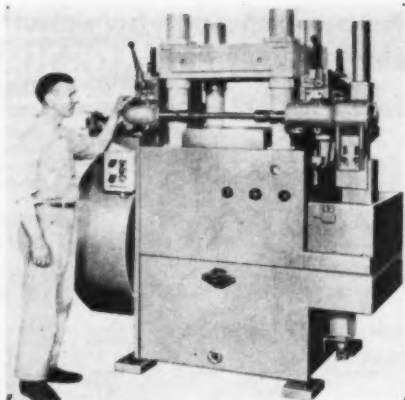
Company Name

Address

City State

Chicago Manufacturing and Distributing Co.
1906 West 46th St., Chicago 9, Illinois

**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**



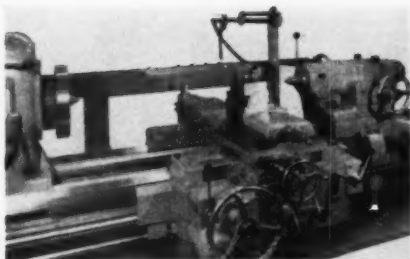
combination, strokes can be inched, single or continuous. Clearance between columns, right to left, 19"; front to back 15". Other sizes, right to left between columns, available in multiples of 6". Front to back dimensions remain constant. Automatic force feed lubrication to all moving parts including roll feed, pull-out rolls and scrap cutter; all controls are electrical.

Point loading of 75 tons can be handled anywhere along the center line of the machine, right to left, column to column. Press will handle unbalanced dies without distortion, it is claimed. Shut height adjustment at top permits accurate re-leveling of upper ram in respect to bolster plate.

Use ACTION Card, opposite page 64. Encircle No. 62

**Combination contour boring and
turning lathe is tracer controlled**

The American Tool Works Co., Dept. B, Cincinnati 2, Ohio, has introduced a combination lathe for boring and turning workpieces having irregular contours as deep as 8" on a side. The basis of this machine is the 25" 50 h.p. Pacemaker equipped with hydraulically actuated cross slide which follows the contour of the flat work template causing the cutting tool to reproduce the template shape on the work. Interchangeable boring and turning rests are furnished providing for rapid change-over from boring to turning and vice versa. The boring rest forms a substantial mounting for the 6" dia. boring bar and is provided with an auxiliary bearing support across the right-hand carriage wings for maximum rigidity.



ty. Cutting coolant is introduced to the cutting tool through the center of the boring bar.

Illustration shows the machine arranged for contour turning operations, utilizing a compound rest with heavy duty, double screw, tool holder. In the photograph can be seen the flat work template in position with contacting stylus, which actuates the tracer valve, controlling the admission of the 300 p.s.i. pressure hydraulic fluid into the cylinder, which in turn reacts against the piston and thus controls the movement of the cross slide which carries the tool rest.

This combination contour boring and turning lathe is particularly adapted to machining the intricate work contours encountered in jet engine and guided missile production.

Use ACTION Card, opposite page 64. Encircle No. 63

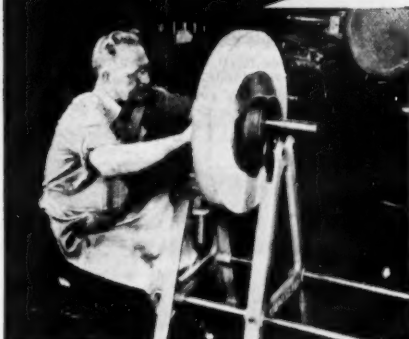
Radial saw designed for cutting bronze and aluminum

Radial Cutter Mfg. Corp., Dept. B, 831 Bond Street, Elizabeth 4, N.J., has announced the availability of their new blade for cutting bronze and aluminum.

The manufacturer says this blade used on a radial cut-off machine will cut through 4" bronze barstock in 4 seconds. The same type of blade, used on same type of machine cutting aluminum extrusions, 24ST, 53ST, 75ST, 61ST, 75ST6, 14ST6, also solid hard stock, has been known to cut 200 hours before sharpening.

Principal features of these saw blades are a heat-treated, precision-ground, steel blade, successfully designed to avoid vibration at any speed, and permanently brazed, extremely tough, durable and wear-resistant carbide tips. Each Radialloy-tipped blade has full steel backing for maximum support as well as a special safety lock designed to prevent the tip from flying off. These fea-

Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES

Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

FREE DATA



You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 449



SUNDSTRAND MACHINE TOOL CO.
2535 Eleventh Street, Rockford, Ill., U.S.A.

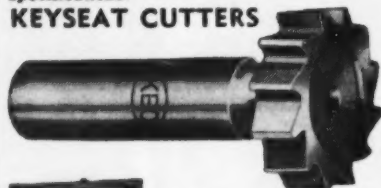
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CENTER DRILLS



Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.

KEYSEAT CUTTERS



High speed, high hand $\frac{1}{2}$ " shank. Diameter from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Standard sizes in stock for immediate delivery. Complete set—41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



CENTER REAMERS

High speed steel. Reamers from $\frac{1}{4}$ " to 1" regularly furnished with 60°, 82°, 90° included angle. Specials made for your specifications.

LATHE MANDRELS



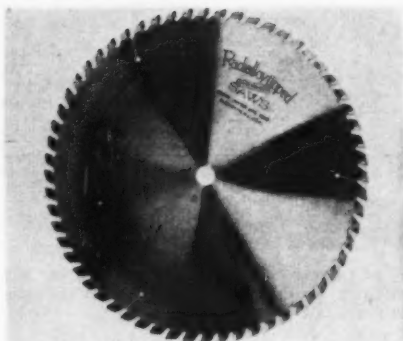
Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from $\frac{3}{16}$ " to 1" are .0005" undersize at small end, from $1\frac{1}{2}$ " to 3", .001" undersize. Immediate delivery.

Write for Literature

Illustrated literature and prices on all KEO Products mailed on request.

KEO CUTTERS

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tures, plus the precision diamond grinding and the special superfinish given to the cutting edge, produce a sharp, long-life saw, which cuts cleaner, faster and requires a minimum of re-sharpenings.

Use ACTION Card, opposite page 64. Encircle No. 64

Removes paint from brick walls

A new cutter head has been developed for use with a Stow flexible shaft machine.



chine for removing paint from brick walls. This is a necessary operation before brick or concrete walls can be water-proofed. With this Stow N40 machine

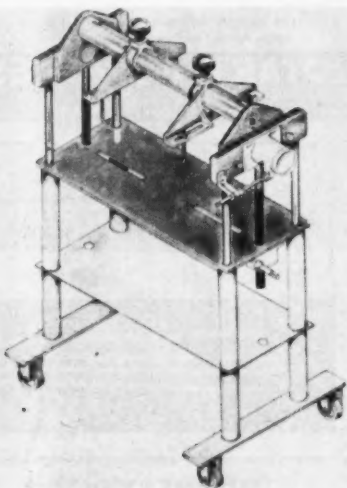
and the special cutter head, one man can do the same amount of work that it formerly took four to six men to do, the manufacturer says.

The cutter head is precision built and balanced so that it can operate at high speeds. Machine can be operated at 1750 r.p.m. By adjusting the belts lower speeds can be obtained according to the finish desired. Stow Mfg. Co., Dept. B, 30 Shear St., Binghamton, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 65

Portable die handler for dies to 18" x 24"

The Hansford Mfg. Corp., Dept. MTB, 1240 University Ave., Rochester, N. Y., has offered the Model 1016 die handler to handle dies measuring as large as 18" x 24". It will hold the top die section by means of clamps which allow the tool-maker to reach any screws on the top



which hold punches or segments. The die is separated by means of an elevating crank which operates a lead screw on both ends of the handler.

After separation, the top section of the die may be revolved by means of a worm and worm gear. A hand crank permits revolving 360°. Positive locking in the 0° position is assured by means of pins. This permits light tryout of the die. The unit is portable.

Use ACTION Card, opposite page 64. Encircle No. 66

Only

THRIFTMASTER Universal Joint Type DRILL HEADS

have these exclusive* features

*Standard Full Ball Bearing Construction, including Spindles

Driving assembly is Full Ball Bearing mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



*Standard Slip-On and Slip-Off Template Construction

For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

6 Standard Models . . . Models U-608 and U-1000—Ball Bearing. Models U-620B and U-1012B—Plain Bearing, 11/16" or 1/2" min. centers. Models U-608-BS and U-1000-BS—Ball Bearing Gear Case, Plain Spindles.

Semi-Standard Heavy Duty Full Ball Bearing

1/2" in Cast Iron—1-7/16" min. centers—7 1/8" or 9 3/4" dia.
1/2" in Steel—1-13/16" min. centers—7" or 9 5/8" dia.

Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

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Subsidiary of
Thomson Industries, Inc.

THRIFTMASTER Products Corporation

1030 N. PLUM STREET
LANCASTER, PENNA.

Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

opens 8½". Weight 125 lbs.	\$110.88
No. 4, 6" jaws, 1½" deep.	\$ 31.34

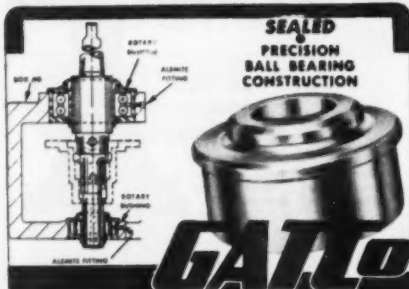
Model 4, 6" dia., 17 1/2" deep, opens 5". Weight 45 lbs. **\$ 81.84**

**Our complete line includes Vises for Drill Presses,
Milling Machines, Shapers and Grinders.**

Prices are net, f.o.b. Chicago. Write for illustrated

Prices are set, U.S.G. Chicago. Write for immediate folder today. Dealers inquiries solicited.

3230-32 Archer Ave.
Chicago 8, Ill.



The inner race of the GATCO bushing rotates with the tool, piloting and tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

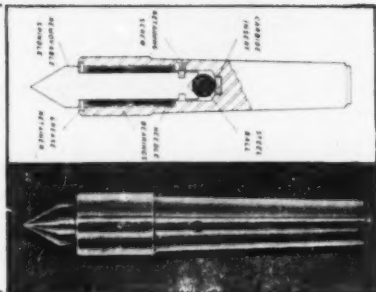
Write for full information and prices.

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Telephone PLYMOUTH 1472

Prove to your satisfaction that Wee Live Centers afford faster, chatter-free, accurate performance in lathes, grinders, hobbors. Test one, learn why leading companies order and re-order. No. 3, M. T., \$24.00. Your money-back if center does not prove its worth in 24 day-trial. Request complete price list, many sizes, tapers, shanks.

Write direct, if distributor cannot supply you.

HERBERT CROSS & SON, Bala-Cynwyd 2, Pa.



One-way Tool Feed — 6, 9 and 12" sizes.

Two-way Tool Feed — 9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

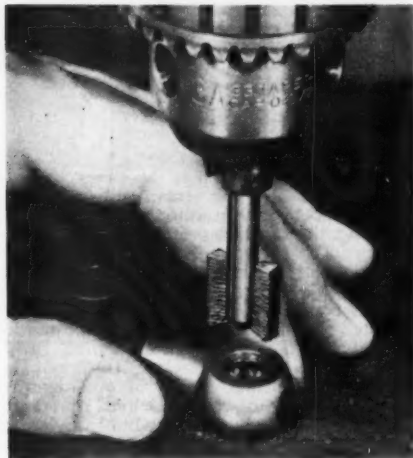
Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

Small brushes contact hard to reach surfaces

Power brushes, many no larger than the end joint of a finger, claimed to be able to contact many surface areas made difficult because of shape and position, are being made by the Osborn Mfg. Co., 5401-4 Hamilton Ave., Cleveland.

Typical applications include: cleaning and finishing drilled holes, removing burrs and chips from various aircraft engine parts; preparing copper terminals



for soldering of electrical fixtures; removing excess rubber from interior of rubber covered flexible tubing to expose braided wire.

Use ACTION Card, opposite page 64. Encircle No. 67

Gas-fired radiant tube atmosphere box furnace

Said to be the first large scale application of radiant tubes to toolroom-size furnaces, the Lindberg gas-fired radiant tube atmosphere furnace is suited for heat treating virtually all production and tool steels, except high-speed, where it is essential to keep the work scale and decarburization free.

The tubes are suspended along the sides of the furnace chamber, eliminating the need for great strength required for horizontal tubes. The light straight tubes give maximum heat transfer rate through the tube wall and minimum internal tube temperature for long life, it is claimed. All tubes are fired at the



T-BOLTS

BOLSTER & T-SLOT TYPES

to J. I. C.

press room standards

Forged, precision machined
heat treated. Tensile
strength 150,000 lbs.

SIZES

BOLSTER BOLTS — dia. to 1 1/2"
Heads sq. to 3" hex. to 2 1/2"
T-Slot bolts, 1/2", 3/4", 1" dia.
lengths to 12", 1" dia. 4" to 22"
long.

NUTS — hardened — threaded to
close fit. **WASHERS** — hardened
— ground both sides.

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26931 W. 7 Mile Rd.
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TWX - DE 894



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PRECISION DIAMOND TOOLS

Industrial Diamonds
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Manufacturers of DIAMOND WHEELS

and Hones of
highest quality.
Prompt deliveries.

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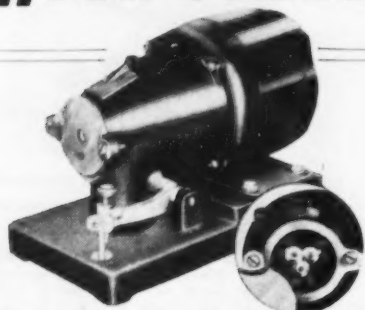
Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.

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HIGH SPEED



WIRE STRIPPER

Only
\$132.50
F.O.B.

Completely removes any insulation, including plastic, cleanly from solid, stranded or multi-conductor wire to $\frac{1}{8}$ " diameter. Exclusive Triple-Disc cutting mechanism centers work, gives more, sharper cutting edge.

HIGH SPEED FREE LITERATURE
311 NORTON ST. **HAMMER CO., INC.**
ROCHESTER 21, N.Y.

Cut Costs on Hole-Cutting! USE THE NEW... BOREMASTER

Finished holes
 $1\frac{1}{2}$ " to $11\frac{3}{4}$ "
diameter to a
depth of 8" on
your present
equipment!



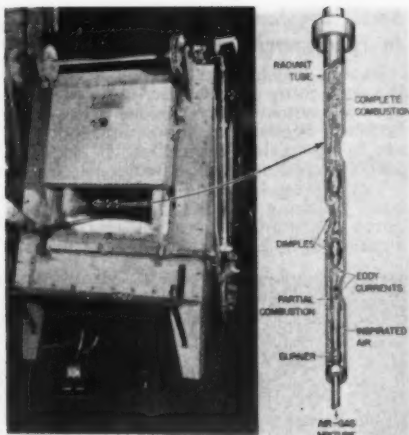
BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember...

TIME SAVINGS + MATERIAL SAVINGS
= COST SAVINGS

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KARL A. NEISE

404 4th Ave. Dept. BB, New York 16, N.Y.



lower end and are removable through the furnace arch without the need for cooling the furnace or interrupting the operation.

The shell is made of heavy steel plate reinforced with structural members to prevent warpage and is continuously welded to be gas tight. An automatic gas-air curtain is provided which fully covers the vestibule when the door is opened preventing influx of outside air. The gas curtain ignites when the door is raised and shuts off when the door is closed.

Furnace doors are of the vertical lift type, actuated by means of an air cylinder controlled by a foot operated valve. This arrangement permits the operator to have both hands free for handling work in and out of the furnace.

Use ACTION Card, opposite page 64. Encircle No. 68

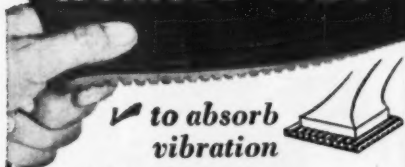
500% production increase with new brushing method

A new mass production brushing method for deburring and blending of surface junctures and surface irregularities of gear racks is resulting in production increases of more than 500 per cent for American Type Founders, Inc.

Designed and developed by American Type Founders engineers, with the co-operation of The Osborn Manufacturing Company, to deburr 17 foot gear racks, the new method, utilizing power brushes, has cut deburring and finishing time from 50 minutes per unit to less than 10 minutes.

The setup provides a completely auto-

Put machines on ISOMODE® PADS

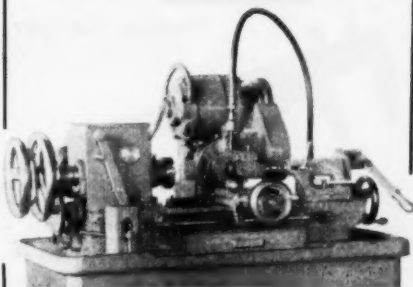


- ✓ to absorb vibration
- ✓ reduce noise
- ✓ cut maintenance

Economical, effective mounting — 1 sq. ft. enough for 4 tons of machine weight. Neoprene — lasts for years, 5/16" thick, 18" square, ten to the standard package. Easily cut to shape and installed under most machines — big punch presses included. No cementing necessary. Write for Bulletin No. 415.

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1067 State Street, New Haven 11, Conn.

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THREAD MILLING MACHINE

Ask for supplementary sheet describing the improvements and having an engraving showing the complete machine.

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WALTHAM MASS.

TO SPARK PRODUCTION

Model "D"

BORING

TURNING

FACING

GROOVING

UNDERCUTTING

ALL IN 1 TOOL-HEAD

A Boring Head that Won't Face is Not Complete

Write Today for Complete Details

CHANDLER TOOL COMPANY
MUNCIE, INDIANA

COMBINED BORING & FACING TOOL HEADS

Chandler Duplex



Looking for a WIDER SELECTION?

ACE has just what you are looking for — the finest Drill Bushings ever made! Now over 22,000 A. S. A. and other standard sizes plus specials. Also hexagon, knurled or serrated bushings for use in soft or castable materials.



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ACE DRILL BUSHING CO., INC.

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LOS ANGELES 29, CALIF.

Fast, Accurate Measurements
With the **AMIC** "Quick-Action"

Vernier Caliper



AT NEW LOW PRICES

The perfect tool for machine shop, tool room inspection and Quality Control. A flick of the thumb and you've got your external and internal dimensions. Knife-edged hardened jaws provide exact thread measurements. A depth gage blade gives speedy measurements. AMIC designed and made exclusively for AMIC by an outstanding European manufacturer. Scientifically engineered, painstakingly machined, packed in a sturdy leatherette case. A tool without rival. Size 6" No. 21B. Graduation 1/40", vernier reading .001.

No. 22B, Graduation 1/40" and full MM. vernier reading .001 and 1/10 MM.

Write for Circular A. Dealer Inquiries Invited

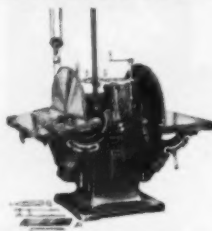
AMERICAN MEASURING INSTRUMENTS CORP.

AMIC BUILDING

2125 44th Ave. Long Island City, N. Y.
TELEPHONE EX-ter 2 0002

"OLIVER" No. 34-DD DOUBLE DISK GRINDER

for fast
and accurate
grinding of
aluminum,
non-ferrous metals and plastics

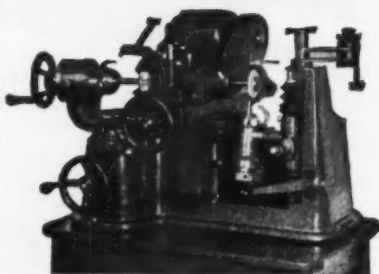


Used in many metal working plants on production work. Has two 30-inch disks. Equipped with one plain table, and one slotted for circle, segment, duplicating gauges for grinding circular, angular, compound shapes. Self-contained hoist handles disks. Table tilts 45° up, 10° down.

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OLIVER MACHINERY COMPANY
Established 1890 Grand Rapids 2, Mich.

HYBCO TAP GRINDER



MODEL 1100

• Capacities No. 0 Machine Screw to
1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.

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TOOL ENGINEERS and TOOL MAKERS

HERE IS
A NEW TOOL TO STUDY.
HIGHEST STANDARD OF EFFICIENCY
AND ACCURACY UNRIVALLED
IN PRICE AND
VALUE

It's the NEW

MICRO LOCK

QUICK CAMLOCK

MICRO FINE ADJUSTMENT COMBINED

made by the
FAMOUS

MAUSER

SPECIFICATIONS

Table Length: 9" - Measuring Capacity:
8" - Graduations: 1/1000" & 1/128" - Code Word: GINDO

Without detachable Base and Scriber - \$25.00
Gauge Base and Scriber - \$33.00

Same as above but with
detachable Base and Scriber - \$33.00
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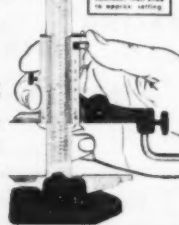
200-MT LAFAYETTE ST. • N.Y. 12, N.Y.



2
Kaiser may now be adjusted
to 1/1000" accuracy by turning
fine screw adjustment.



1
Press lever to remove
camlock - then slide
to measure setting.





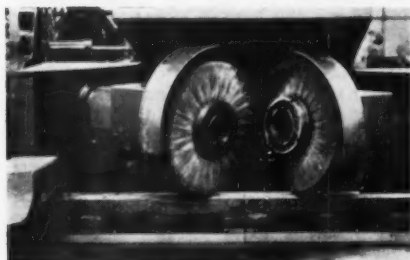
precision PLUS... ETALON NO. 10

hand-fitted Vernier slide is smooth operating, easy to read. English or English & Metric graduations. Sizes from 7" thru 20" measuring capacity. In rich wood contour case.

Invest in life time accuracy with this Hardened Stainless Steel super-caliper. Wide,

Ask your dealer, or write

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matic, gear driven sequence for deburring the gear racks at a speed of five feet per minute. When the entire rack has passed beneath the brushing area, a limit switch reverses both the direction of feed and the rotational direction of the brushes finishing the two opposite sides of the gear teeth.

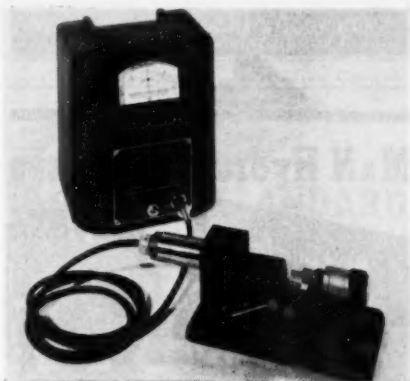
Special fiber fill Fascut brushes manufactured by Osborn were specified. They rotate at 1750 r.p.m. permitting conformation to the irregular contours of the gear teeth. The brushes also do a blending job where surfaces meet. Here they form smooth curves at the junctures in place of fragile sharp edges.

Use ACTION Card, opposite page 64. Encircle No. 69

Electronic micrometer reads to .00001"

A combination of Brown & Sharpe standard precision tools forms an electronic micrometer which measures small parts to .00001" at magnification of 18,000 times. This magnification is continuously variable from 1800 to 18,000 times.

Measuring pressure is adjustable from



how about air vises!

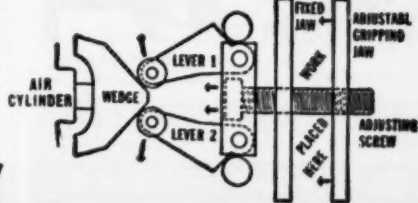
AIRLOX pat'd wedge-3-lever action utilizes total cylinder drive. Positive rigid grip on the work. Especially suited to CARBIDE MILLING. Five models 50 to 200 ft. air line pressure. Write for data sheet. PRODUCTION DEVICES, INC., Whitehall, N. Y.

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three oz. to two and one-half lb. when used at .0001" sensitivity, making it possible to use a measuring pressure suited to the requirements of the work being measured. Brown & Sharpe Mfg. Co., Dept. B, Providence, R.I.

Use ACTION Card, opposite page 64. Encircle No. 70

Double grinding technique gives high accuracy

Faces of carbon rings and segments are ground flat and parallel within .0003" to .0004" by a grinding technique that passes the material through the grinder twice. Both faces are ground simultaneously by a Besly Double Vertical Spindle Grinder equipped with two abrasive discs. On the first pass, .025" to .040" of stock is removed and .008" to .010" removed during the final grind.

The use of rotary feed wheels enables the grinder to complete 720 parts per hour. Two feed wheels are used with the grinder, one for the carbon rings and the other for the segments. Both wheels are readily interchangeable. The speed of feed wheel rotation through the grinder may be adjusted for maximum grinding efficiency. Construction of the grinder permits positioning the rotary wheel so

M&N Hydraulic Presses

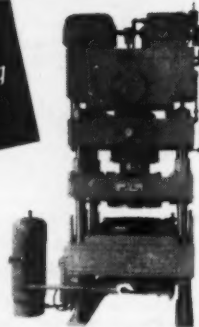
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any Metal Working
Application

Available in
single, double and triple
action models.
Platen sizes: 12" to 60"
Capacities: 20 to 600 tons

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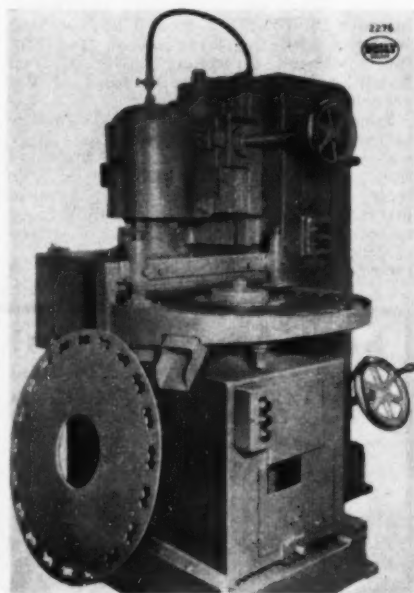


MODEL 200 B 28C
Deep drawing, double action
METAL WORKING PRESS

Price: \$14,907
FOB Clifton, N.J.

M&N Hydraulic Press Co.

778 Route 3 Clifton, New Jersey



that the path of the work between the abrasive discs can be precisely adjusted.

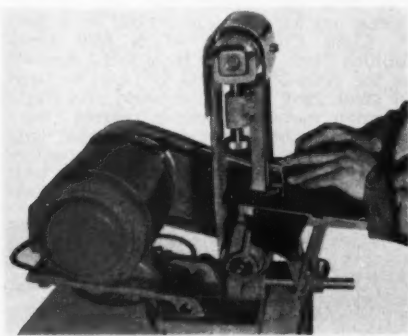
The 23" diameter abrasive discs are completely enclosed for operator safety and protection from coolant spray. Coolant is supplied to the work through the center of the upper abrasive disc spindle. The Besly-Welles Corporation, Beloit, Wisconsin.

Use ACTION Card, opposite page 64. Encircle No. 71

Belt micro finishing machine

A belt micro finishing machine for carbide tool grinding, Lempeo Model 544, eliminates diamond wheel grinding it is claimed.

Operational features include: micro finish on every cutting surface including top, preventing hollowing or rounding of any cutting edge; table designed to



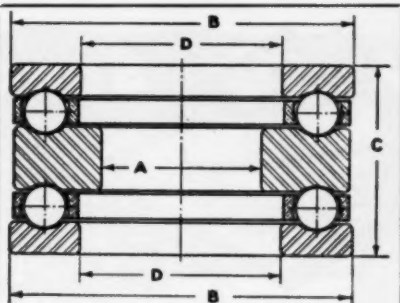
finish all tool edges, including hooked tool edges. Table extensions and angular table settings read directly on a protractor; positive V-belt control with jack-screw adjustment automatically provides correct drive belt tension at all times. Industrial Division, Lempeo Products, Inc., Dept. MTB, Dunham Road, Bedford, Ohio.

Use ACTION Card, opposite page 64. Encircle No. 72

Floor stand engraving machine from bench type

A new floor type engraving machine, Model UE-3F, has resulted from adding a fabricated floor stand, a hand wheel screw work table adjustment and other features to the Model UE-3 Panto engraving machine made by H. P. Preis Engraving Machine Co., 163 Industrial Branch, Hillside, N.J.

The open front type stand has the work table adjustment hand wheel immediately



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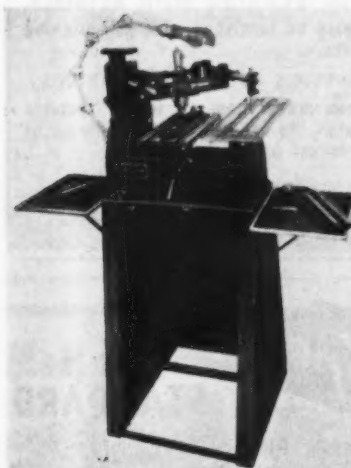
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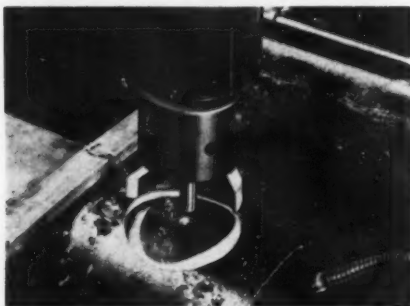
DETROIT STAMPING COMPANY

347 MIDLAND AVENUE • DETROIT 3, MICHIGAN



Tool solves hole cutting, clean-up and sizing jobs

A new tool design for hole making operations has been announced by Robert H. Clark Co., Dept. MTB, 9330 Santa Monica Blvd., Beverly Hills, Calif. Known as the Hole-Maker, the tool can be used in steel, cast iron, aluminum and other common metals. It grinds correct clearance angles on bits and uses proper cutting speeds and feeds for each respective metal, the manufacturer claims. The unit produces holes in all thicknesses between



in front of the operator. A foot rest is provided, and a 10" x 12" shelf is placed at each side for holding tools, cutters and other items needed by the operator. A flexible aluminum lamp is also available. Use ACTION Card, opposite page 64. Encircle No. 73



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Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

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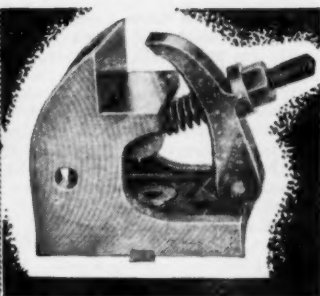
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heavy plate and skin-type materials, may be successfully applied to cylindrical or crowned shapes such as pipe, boilers, tanks, etc.

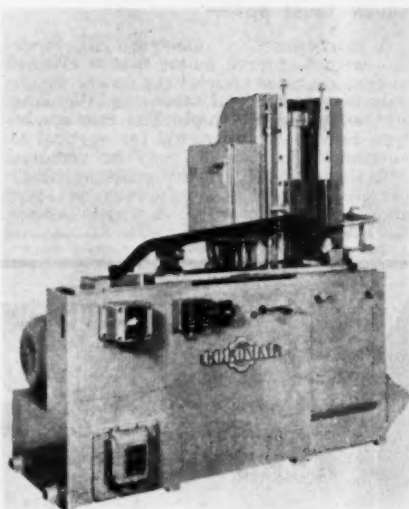
On turret lathes and chucking machines it cleans up cored holes in castings, bores through webbed sections and flashings in forgings. Due to its three bladed design at least one bit remains in constant contact with the work, even on curved surfaces; each bit is adjustable within its tool slot. Cutting edges of each blade are the inside vertical faces.

Use ACTION Card, opposite page 64. Encircle No. 74

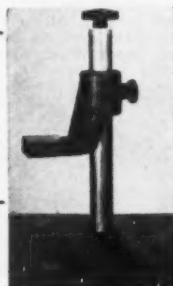
To broach kingpin holes with fixture and machine

Kingpin holes in the front axles for automobiles are now being broached on a special Colonial Broach machine. Company engineers designed a simple fixture that supports the I-beam during the broaching operations.

Machine handling this job is a vertical pull-down unit, Model No. BM-144. It is rated at 6 tons and has a 24-inch stroke. Two simple fixture sections locate and support the axle. The fixture does not have a clamp. The action of the broach



being pulled through the part and the fixture section is sufficient to hold the axle in rigid and accurate contact with the fixture during the work stroke. A



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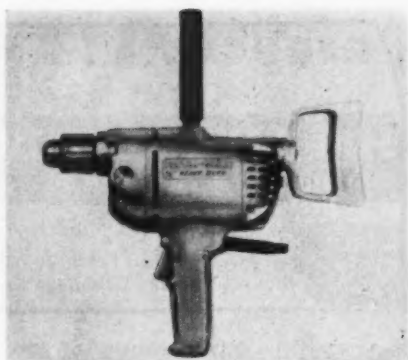
GARREAU & CO. 351 THAMES ST.
NEWPORT, R.I.

second section of the fixture is comprised of two blocks—one mounted to the fixture base with the block mounted at an angle on top. With this arrangement the operator lowers the axle mounting pad onto the angle support block and with the broaching tool aligns the kingpin hole with the locating hole in the first section of the fixture. The rough kingpin holes on the steel forged I-beam are 0.906" in diameter. After broaching, the hole has a 0.922" diameter and a length of 2.435". Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Mich.

Use ACTION Card, opposite page 64. Encircle No. 75

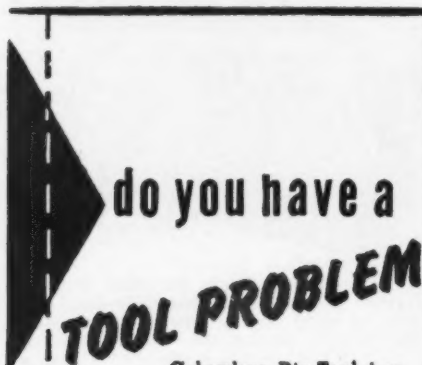
New 1/2" drill claims more chuck twist power

A heavy-duty 1/2" electric drill, Model 516, with 6-ampere motor that is claimed to develop more chuck twist power weighs only ten pounds and measures 14 1/4" long, 3 1/2" wide and 9 1/4" high. The rear spade-type handle is adjustable for vertical or horizontal position, or may be removed entirely. An auxiliary two-position handle permits operator to apply more pressure and maintain accuracy. A trigger switch



provides finger-tip control, with a push button lock for one-hand operation. The drill has a 1/2" gear type chuck. Bit capacity is rated at 1/2" for steel and 1 1/8" in wood.

Eight ball bearings and double compound reduction gears are claimed to assure maximum sustained drilling power. Helical teeth on armature pinion and first reducing gear provide strength and quiet operation. The housing is made of aluminum alloy. Brush holders are ac-



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cessible from the outside.

A universal 115 volt ac-dc motor drives the chuck at 550 rpm. The spindle offset is 1 1/8". A vertical drill stand has been designed by the manufacturer to convert the Model 516 into a drill press. Porter-Cable Machine Co., 25 Exchange St., Syracuse 8, N.Y.

Use ACTION Card, opposite page 64, Encircle No. 76

Grinder sharpens chamfers of taps

The Henry P. Boggis & Co., 710 E. 163rd St., Cleveland 10, Ohio, has announced a new Model 1300 tap grinder developed for tap users who desire facilities for sharpening the chamfers of taps.

Capacities are from No. 0 machine screw taps to 1 1/2" hand taps, 1/8" to 1" pipe taps, right or left hand threads with various numbers of flutes according to accessories selected. The machine is available with floor stand or without stand for use as a bench machine.

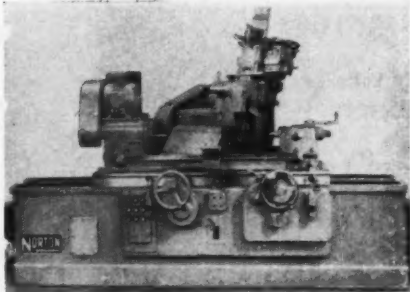
Use ACTION Card, opposite page 64, Encircle No. 77

Grinding machine replaces former model

Norton Co., 20 New Bond St., Worcester 6, Mass., has announced its Type CV-4 semiautomatic angular wheel slide grinding machine, which replaces the Type C angular machine.

The CV-4 grinds thrust surfaces and adjacent diameters simultaneously in a single, automatically controlled plunge grind. It produces a concentric grain pattern in the finish of the shoulder or thrust surface ground.

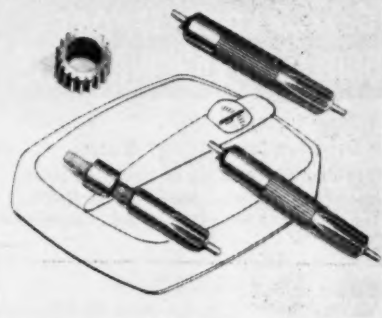
Faster sizing qualities and simplified operation are claimed for the machine, due to the feeding efficiency of the CTU type wheel feed mechanism with its hydraulically rotated, micrometer-screw feed. This mechanism also includes a click-count index with which settings for work diameter reduction in increments



October, 1954

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The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths. Use as a scribe for fast layout, or insert dial indicator for quick, accurate inspection.

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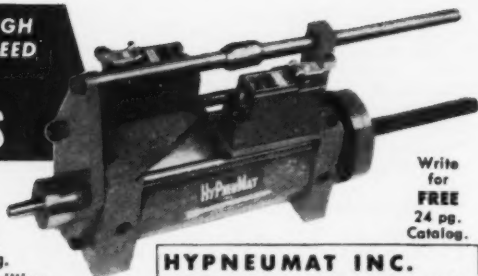
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- Stroke Lengths to 12"
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as fine as .0001" are made.

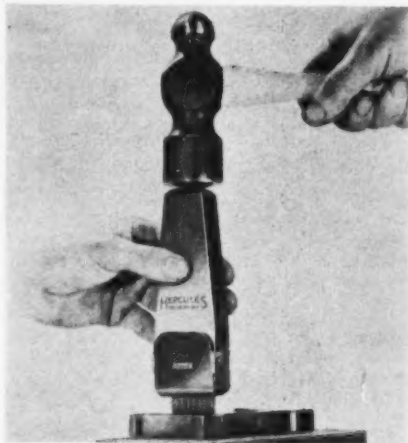
Both the length and rate of automatic feed are set from the normal operating position. The hand wheel which adjusts the grinding wheel feed has been located on the machine base at the operator's right hand instead of on the movable wheel slide as on the earlier machine. This graduated wheel continually indicates the amount of feed as it rotates past a fixed pointer in both manual and automatic feed.

The type CV-4 machine is available in 10" and 14" swings, and in 36", 48" or 72" work lengths in either swing. In addition to hydraulic power table drive, an auxiliary hand drive mechanism is provided.

Use ACTION Card, opposite page 64. Encircle No. 78

Light weight holder for type

A light weight holder to hold interchangeable gang type for stamping on steel, cast iron and other materials has been made available by the Acromark Co., 15 Morrell St., Elizabeth, N.J. Made of one piece of steel in which is a rectangular shaped mortise to receive interchangeable type, sizes range from a two piece capacity holder to an eight piece holder.



They may be used with less than full capacity by substituting blank spaces for the type characters.

There is a spring tension clip that holds the type in position from the outside of the holder. Immediate changing of type

MIRACLE NO-TORCH COLD SOLDER

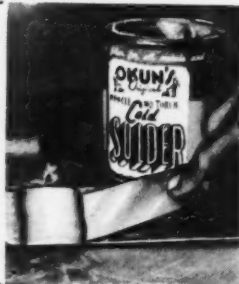
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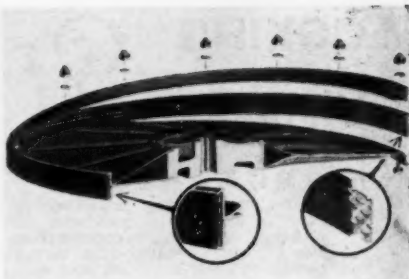


is effected by simple pressure on the front clip and removal of the type.

Use ACTION Card, opposite page 64. Encircle No. 79

New tires standard equipment for band saw wheels

Carter Products Co., Inc., Dept. W, 30 Ionia Ave., S.W., Grand Rapids 4, Mich., has announced the installation of Jiffy tires as standard equipment on all Carter rigid wheels, with availability in all sizes for any band saw. This new combination supersedes their 30" and 36" size quick



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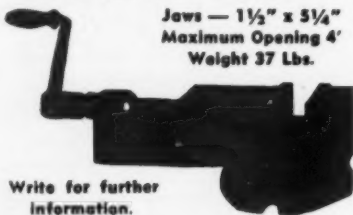
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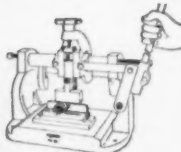
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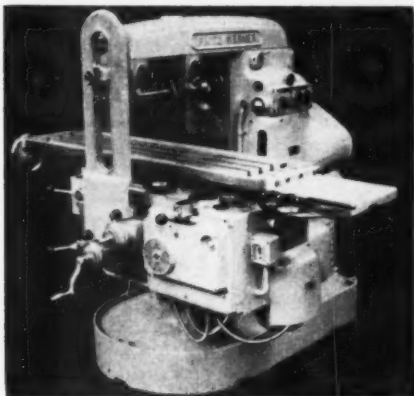
THE ACROMARK CO.

13 MORRELL ST.

ELIZABETH 4, NEW JERSEY

Knee type milling machine

The Werner knee type milling machine Model 8103 was developed from previous types of automatic machines. A large selector dial at the front per-



mits quick setup of a variety of automatic and semi-automatic cycles for the longitudinal traverse of the table.

Principally the following combinations are possible:

1. Automatic pendulum milling from center of table to left and right with or without spindle reverse. While one piece is being machined, a second piece is being loaded. Return can be set to occur automatically or by pressing a switch.

2. Continuous milling of one or more surfaces either from left to right or right to left. This cycle can be set to be continuous or under control of the operator.

3. Dividing head milling with rapid approach milling feed, rapid return, indexing, etc., up to a maximum of fifty indexes. Several types of dividing heads are available for this operation.

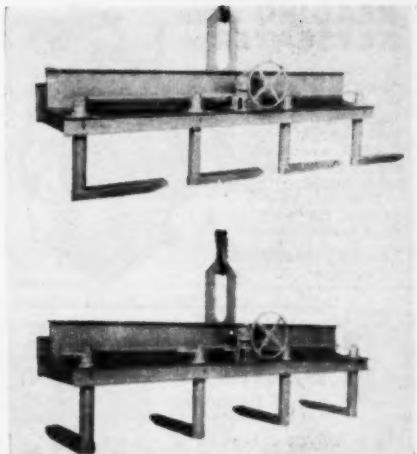
4. Climb milling. Automatic backlash eliminator available. Distributor, Marac Machinery Corp., Dept. B, 1819 Broadway, New York 23, N.Y.

Use ACTION Card, opposite page 64. Encircle No. 95

Strip material grab operates on new principle

Mansaver Industries, Inc., Dept. MTB, 310 East St., New Haven, Conn., have announced an improved strip material grab operating on a new principle.

The rotating legs fit in between close-laid piles of narrow strip material, then



swing under the load to take a lift without a supporting pallet. Floor space is claimed to be cut almost in half, because stacks need little more than the thickness of the grab leg between them instead of its length.

Use ACTION Card, opposite page 64. Encircle No. 96

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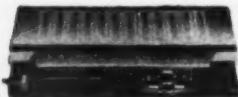
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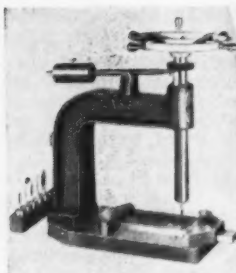
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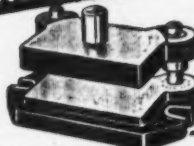
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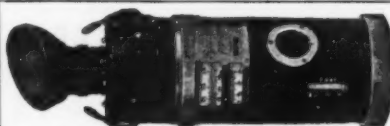
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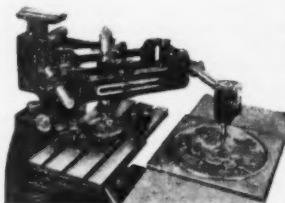
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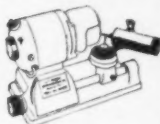
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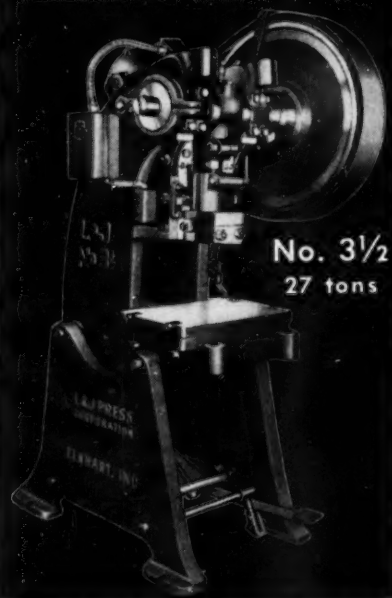
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New multiple v-belt application

A new concept of power transmission, the Poly-V Drive, has just been introduced by the Manhattan Rubber Div., Dept. B, Raybestos Manhattan, Inc., Passaic, N. J.

The Poly-V belt, which is a single, endless rubber belt with a series of parallel V ribs molded lengthwise around the inside circumference, has an uninterrupted, high-strength member of synthetic cords across its entire width.

The Poly-V sheave grooves are designed to mate precisely with the belt ribs, and since the belt covers the full width of the drive member (not an assembly of several V-belts), the load is distributed equally over the entire driving surface. This provides twice the contact area of a comparable multiple V-belt application so that Poly-V Drive is claimed to give up to 50% greater horsepower with the same width or equal horsepower with 1/3 less sheave width.

Design features of the Poly-V Drive reduce face pressure one half, giving longer life to belt and sheaves. Also, the full drive width and the total traction surface contact prevents belt turnover and progressive sinking in sheave grooves.

One of the most important features of the new drive is that it eliminates belt matching problems common to multiple V-belt applications. Also, it affords a marked economy in belt and sheave in-

ventories. Poly-V is available in two cross-sections; No. 187 and No. 375. These two sizes meet all drive requirements from 3" pitch dia. sheaves and 50" belt pitch lengths upwards. It is designed for applications where A, B, or C section multiple V-belts would be used; and No. 375 for C, D, or E section multiple V-belt applications.

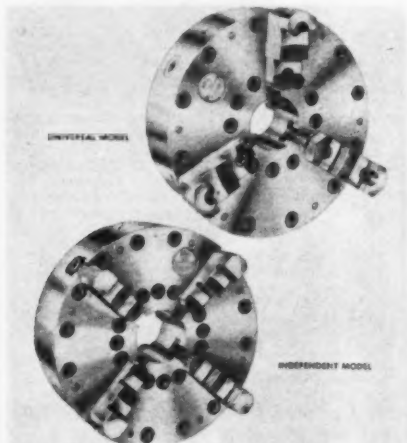
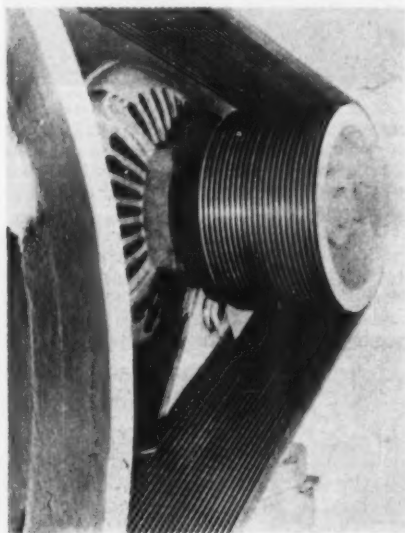
Use ACTION Card, opposite page 64. Encircle No. 101

New chuck design

A different type of design and construction is featured in a line of machine tool chucks now available from The Whiton Machine Co., Dept. BB, New London, Conn. Identified as Whiton segmental plate type chucks, the new accessories are said to be a distinct improvement: Jaw slots are formed in separate, segmented plates which are subsequently mounted on the chuck body; these plates are hardened and finish ground before being assembled on the chuck's body; the jaw slots are said to be extremely accurate and to possess long wearing qualities.

The new segmental chucks are offered in both independent and geared scroll models. A feature of the independent model is its full circle thrust bearing which is locked into position within the chuck body by the segmental plates.

Construction features of the scroll type chuck include hardening and grinding of both scroll bearing surface and the spindle mounting section which is applied to the American Standard spindle nose.



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change tire.

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Use ACTION Card, opposite page 64. Encircle No. 60

Large bore clutches

A new series of large-bore clutches for over-running, indexing, and back-stopping has been announced by the Formsprag Co., Dept. B, 23601 Hoover Rd.,

Van Dyke, Mich.

They are claimed to provide maximum torque capacity for size and weight and instantaneous engagement (without head shaft wind-up).

Use ACTION Card, opposite page 64. Encircle No. 81

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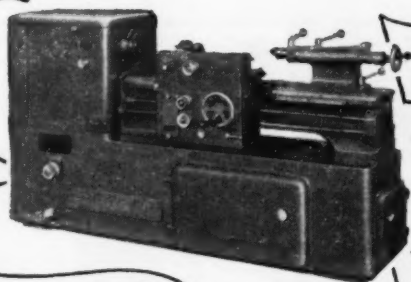
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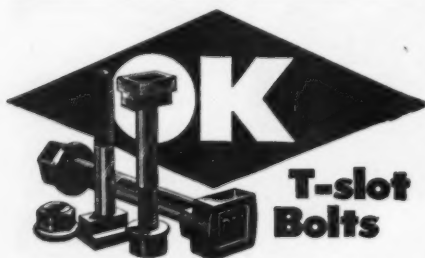
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This model, VH-215, can be quickly set up and put into operation for a single

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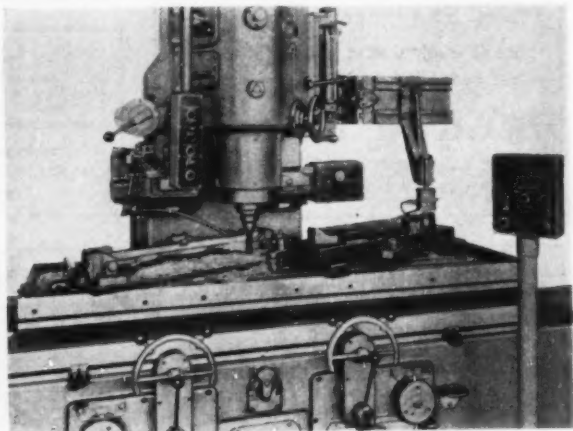


power is developed by actuating the hand lever. Releasing of the hydraulic pressure by turning a knob, located below the handle, gives rapid return of the broach to the starting position. Stroke of 15" of broach travel; each stroke of the hand lever results in $\frac{1}{2}$ " of broach travel. Table size is $16\frac{1}{2}$ " by $16\frac{1}{2}$ " and the unit requires a floor base area of only 18" x 18".

Use ACTION card opposite page 64. Encircle No. 82

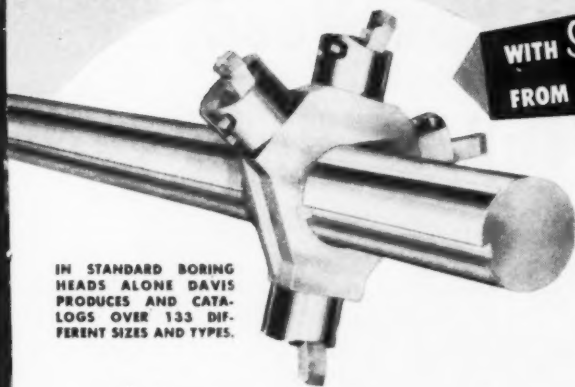
Reed Prentice Co., Worcester, Mass., No. 4 milling machine equipped with General Electric's new two-dimension all-electric tracer control. This front view of machine shows aluminum aircraft spar workpiece and template. Tracing control panels, 1 hp amplydyne feed drives.

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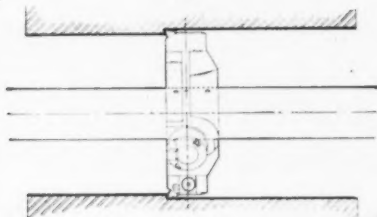
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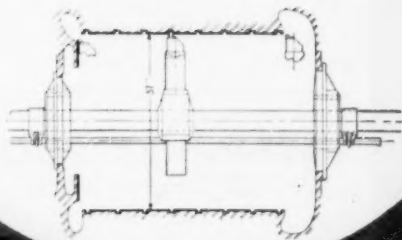
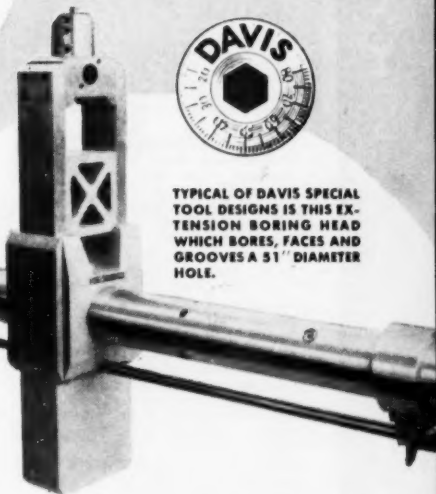


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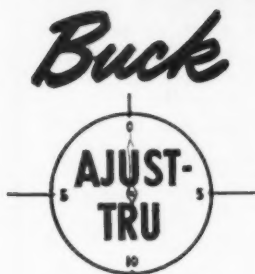
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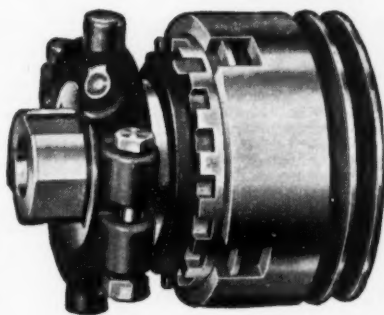
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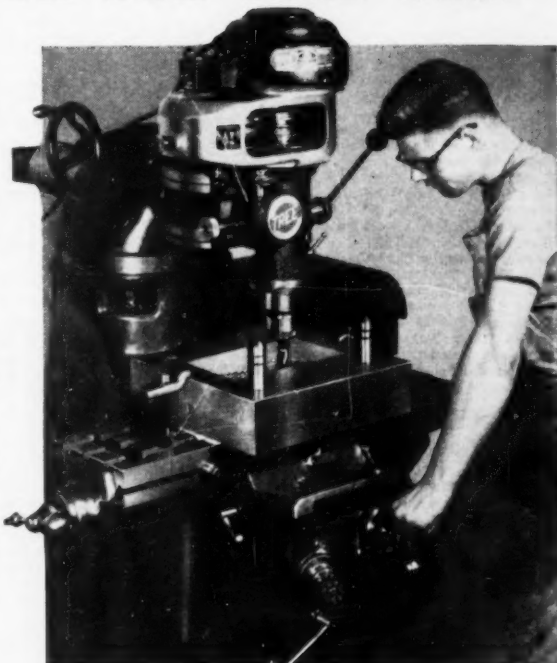
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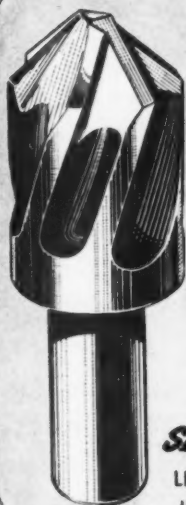
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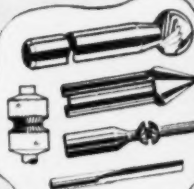


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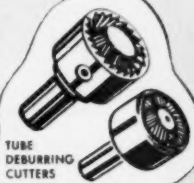
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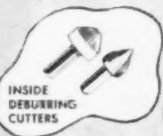
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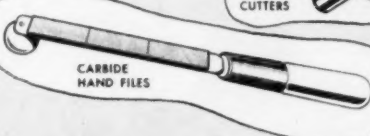
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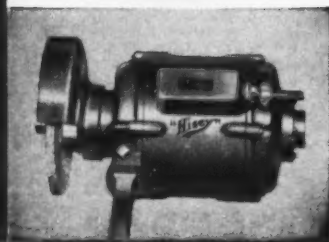
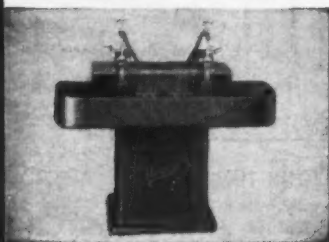
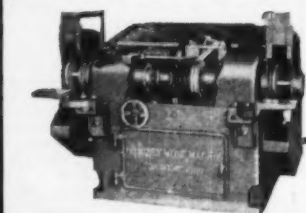
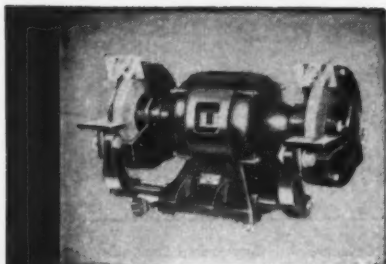
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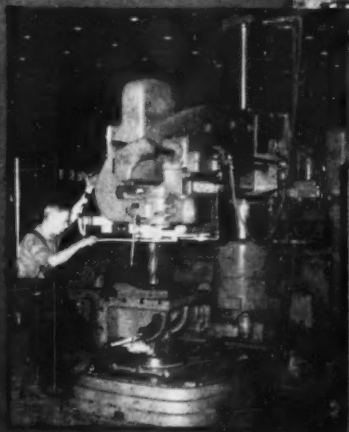
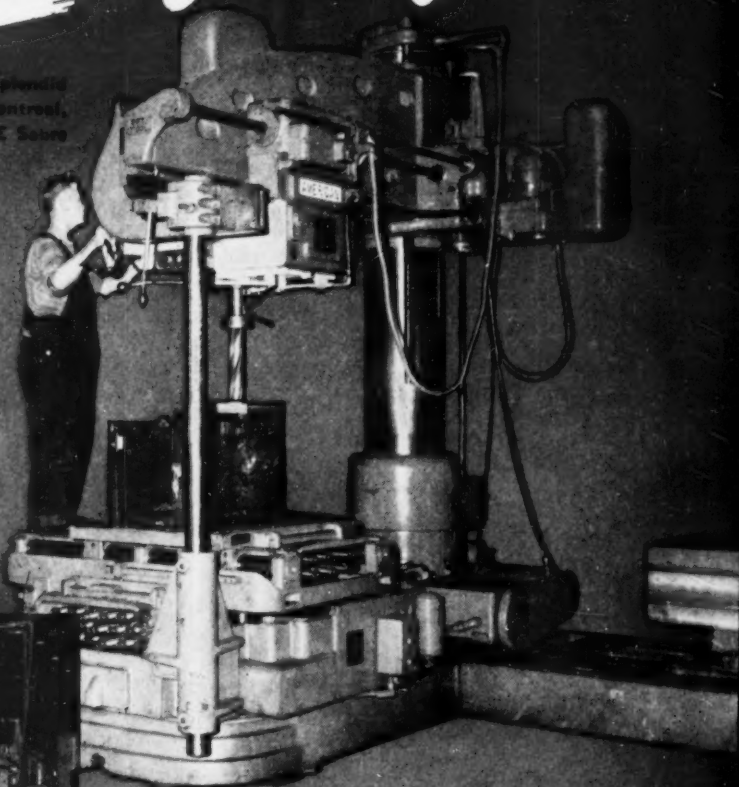
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"AMERICAN" Hole Wizard Radials are playing a prominent part in the production of critical defense items for both the U. S. A. and Canada.

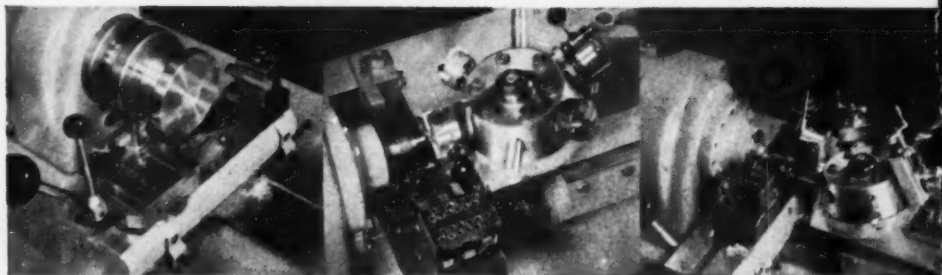
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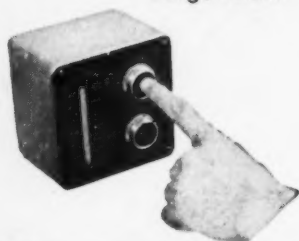
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